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Project Description

Purpose

The purpose of the assessment is to characterize the ecological and social conditions in the South Fork Clearwater Subbasin and to provide a context for future forest management decisions on National Forest lands. The assessment focuses on the diversity, distribution, and abundance of plant and animal species, watershed conditions, transportation needs, and forest human uses and trends.

Other Planning

The South Fork Clearwater Assessment is the first of three midscale planning assessments for the Nez Perce Forest. The other two, the Salmon River and Selway-Middle Fork, are scheduled for a later date. While the assessments do not result in project decisions, they do provide background information for future planning and management on the Forest.

In 1994, the Forest Service (FS) and the Bureau of Land Management (BLM) initiated the Interior Columbia Basin Ecosystem Management Project (ICBEMP) to determine the status and health of the Interior Columbia Basin ecosystem, an area that includes 145 million acres in 164 subbasins. As part of the study, the two agencies were directed to develop and adopt a scientifically sound ecosystem strategy for managing all FS and BLM lands in the Basin. Descriptions of the status and trends related to the airshed, aquatic ecosystems, vegetation and wildlife, economic activities, and social values are summarized in the *Integrated Scientific Assessment for Management in the Interior Columbia Basin and Portions of the Klamath and Great Basins* (Quigley et al. 1996)(hereafter referred to as the "ICRB Science Assessment"), which was published and distributed in September, 1996.

In addition, *An Assessment of the Ecosystem Components in the Interior Columbia Basin and Portions of the Klamath and Great Basins* (Quigley et al. 1997)(hereafter referred to as the "ICRB Component Report") was published and distributed in June, 1997. The four volume ICRB Component Report is the companion document to the ICRB Science Assessment, and provides the detailed resource background information that is summarized in the ICRB Science Assessment. The South Fork Clearwater Subbasin Landscape Assessment has considered the findings from both of the above referenced documents and has incorporated them where appropriate recognizing the differences in project objectives, data resolution, and spatial and temporal scales.

The South Fork Assessment is not designed to address site specific resource concerns or needs. Instead, the assessment is focused at the landscape level and provides a context for future project analyses and/or ecosystem analyses at the watershed scale (EAWS). The assessment should allow future project analyses to more effectively respond to cumulative effects issues.

Objectives

The objectives identified for the South Fork Assessment are:

- Characterize historic and existing conditions in the subbasin in terms of landscape elements, functions and processes
- Assess significant changes to landscape elements, functions and processes from presettlement conditions
- Recommend strategies which lead to sustainable ecosystems
- Identify actions for National Forest lands which produce desired and feasible change

- ❏ Identify issues to be addressed during the revision of the Forest Plan

Public Involvement
The public involvement plan prepared for the assessment identified the need for continuous communications with forest users and other interested publics. In the early stages of the assessment, public workshops were held at Grangeville, Kooskia, and Elk City. Additionally, letters were sent to over 400 individuals and organizations soliciting information on landscape conditions, resource issues, special places, and expectations for future management. Responses from the public were used to assess and analyze landscape conditions. A summary of the assessment findings will be sent to workshop participants and other interested parties.

Key Issues
At the beginning of the assessment process, public meeting participants and Forest employees were specifically asked what issues should be addressed by the assessment. From their responses, key issues were identified. The issues served as a focal point for use of existing data, synthesis, and analysis. The most frequently cited issues included the following:

- ❏ Water Quality - Protect, maintain, and restore watershed conditions and fish habitat
- ❏ Timber Supply - Provide for sustainable levels of timber harvest
- ❏ Public Access - Reduce road related effects. Minimize road and trail restrictions and closures
- ❏ Vegetation - Maintain vegetation conditions within a range consistent with sustainable ecosystems and long term disturbance processes
- ❏ Forest Uses - Protect traditional uses and special places

Assumptions
General guidelines were identified early in the assessment process to help define the scope of the work. The guidelines or assumptions adopted included the following:

- ❏ Rely on existing data. Identify data gaps.
- ❏ Use Columbia River Basin Science Assessment findings where appropriate.
- ❏ Use ecosystem management principles
- ❏ Identify integrated treatment objectives for National Forest lands.
- ❏ Focus on assessing landscape conditions. The assessment does not make resource decisions requiring analysis and disclosure procedures specified in the National Environmental Policy Act (NEPA).

Subbasin Description

Location
The South Fork Subbasin (USGS cataloging unit 17060305) is located in North Central Idaho encompassing an area of approximately 1,175 square miles (or approximately 752,000 acres) and has a 206.7 mile perimeter (Map 1). The subbasin extends from the headwaters above Elk City and Red River to the confluence with the Middle Fork of the Clearwater River at Kooskia. Included in the area are 14 major watersheds, plus numerous face drainages that flow into the mainstem South Fork Clearwater River (Map 2).

Land Ownership

The assessment area includes a mixture of private and public lands covering approximately 752,000 acres (Map 2). The Camas Prairie Ecological Reporting Unit (located outside the Nez Perce National Forest boundary) contains approximately 199,000 acres and is mostly private lands, with lesser amounts of BLM, State of Idaho and Nez Perce Tribal ownership.

Of the 553,000 total acres located within the Nez Perce Forest boundary, the approximate ownership breakdown is as follows:

- ❑ Nez Perce National Forest........515,000 acres
- ❑ Private lands........20,000 acres
- ❑ Bureau of Land Management........15,000 acres
- ❑ Idaho State Department of Lands........3,000 acres

Treaty Rights

The Nez Perce people have inhabited the South Fork Clearwater Subbasin for centuries. Prior to the Treaty of 1855, they used the area for hunting, fishing, gathering food, and horse pasturing. The tribal population at that time is estimated to have been 6,000 people. The pre-treaty Nez Perce area of interest included approximately 13 million acres in central Idaho, northeastern Oregon and southeastern Washington.

In 1995, the Nez Perce Tribe had 3,170 enrolled members. Today's reservation contains approximately 760,000 acres. Within the South Fork assessment area, the reservation boundary encompasses slightly less than 100,000 acres, located entirely within the Camas Prairie Ecological Reporting Unit (Map 2). The Tribal headquarters is located in Lapwai, Idaho.

Tribal treaty rights apply to areas beyond the current reservation boundary. The basis for off-reservation Tribal rights and interests on the ceded lands (which encompass the entire assessment area) are shown below in excerpts from the Treaties of 1855 and 1863.

Treaty with the Nez Perce of 1855, Article 3: "The exclusive right of taking fish in all streams where running through or bordering said reservation is further secured to said Indians; as also the right of taking fish at all usual and accustomed places in common with citizens of the Territory; and of erecting temporary buildings for curing, together with the privilege of hunting, gathering roots and berries, and pasturing their horses and cattle upon open and unclaimed land."

Treaty with the Nez Perce of 1863, Article 8: "The United States also agrees to reserve all springs or fountains not adjacent to, or directly connected with, the streams or rivers within the lands hereby relinquished, and to keep back from settlement or entry so much of the surrounding land as may be necessary to prevent the said springs or fountains being enclosed; and, further, to preserve a perpetual right of way to and from the same, as watering places, for the use in common of both whites and Indians."

Communities

Map 2 shows the locations of the communities in the subbasin. Grangeville, the county seat for Idaho County, has a population of approximately 3,208 people and is the largest town in the assessment area. Kooskia (population 708), Cottonwood (population 852), Stites (population 215), Elk City (population 670), Mt. Idaho (population 75), Greencreek (population 50), Clearwater (population 35), Orogrande (population 10), Harpster, Big Butte and Golden are also located within the subbasin (Table 3.3).

Subbasin Features

The subbasin includes many features that are unique and valued by people. A few of the more recognized features are listed below (see Map 3 for locations of some key Federal designations).

- ❑ The Gospel-Hump Wilderness
- ❑ Roadless Areas: Silver Creek-Pilot Knob #1849, Lick Point #1227 and parts of West Meadow Creek #1845C and Dixie Summit-Nut Hill #1235 (see Nez Perce Forest Plan FEIS, Appendices, Volume 1, Appendix C).
- ❑ Rivers and streams eligible for inclusion in the National Wild and Scenic River system (South Fork Clearwater River and Johns Creek)
- ❑ Historic Elk City Wagon Road
- ❑ Pilot Rock Area
- ❑ Historic Crooked River dredge mining.
- ❑ Streams which support spawning and rearing habitat for Chinook Salmon, Steelhead, Bull Trout, and West Slope Cutthroat Trout
- ❑ Elk City Township
- ❑ Camas Prairie agricultural area
- ❑ Lower South Fork river communities
- ❑ Nez Perce Indian Reservation

Chapter 2 - BIOPHYSICAL AND SOCIAL CONCEPTS

Ecosystem Management Goals

This assessment assumes that the overall purpose of ecosystem management is to restore and maintain ecological integrity and socioeconomic resiliency (Haynes et al. 1996). Ecosystem integrity is the degree to which all components of an ecosystem are represented and functioning. Resiliency is the ability to adapt to change. More specific goals that can be used as benchmarks in assessing ecosystem condition are:

- Maintain evolutionary and ecological processes. In order to maintaining these processes, we must first understand the basic biophysical conditions and processes within an area, and their associated disturbance regimes.
- Manage with an understanding of multiple ecological domains and evolutionary time frames. This means considering the broad spatial and temporal context in which management actions occur.
- Maintain viable populations of native and desired non-native species. Sustaining viable populations is essential to maintaining ecosystem function.
- Encourage social and economic resiliency. Resilient communities are adaptable to change and tend to have a diverse economic base and a cohesive sense of community.
- Manage for places with definable values. Understanding how different people define special places can help reduce conflict.
- Manage to maintain the mix of ecosystem goods, functions, and conditions that society wants. Some goods are commodities, some are experiences, some are valued for their existence, and some are functions like nutrient cycling that sustain a system's ability to produce other goods.

Biophysical Concepts

Biophysical Environments

Biophysical environments are the geologic, climatic, and landform settings that constrain ecological processes (ICRB Science Assessment). They describe ecosystems that behave in a similar manner. This helps interpret and predict patterns of plant communities, wildlife habitats, stream channels, and dominant disturbance processes and successional pathways. In this assessment, landforms, climate, habitat type groups (potential vegetation), geology, and valley bottom morphology were used to build classification systems that help interpret and predict condition and response in a diverse landscape like the subbasin.

Mapped classifications used in this assessment include habitat type groups (HTGs), vegetation response units (VRUs), and aquatic landtype associations (ALTAs). Ecological reporting units (ERUs) are watersheds or aggregates of watersheds in the subbasin. Some ERUs were subdivided to account for measurable and significant biophysical differences within an ERU. These classifications are described in Appendix C.

Climate - Climate is the basic environment that affects soil development and vegetation dynamics. Northern Idaho is dominated by Pacific maritime air masses and prevailing westerly winds. Over 85 percent of the annual precipitation occurs during the fall, winter, and spring months. Cyclonic storms, consisting of a series of frontal systems moving east, produce long duration, low-intensity precipitation during this period of the year. During winter and spring, this inland maritime regime is characterized by prolonged gentle rains and deep snow accumulations at higher elevations with fog, cloudiness, and high humidity. Winter temperatures are often 15 to 25 degrees warmer than the continental locations of the same latitude. The climate during the summer months is influenced by stationary high pressure systems over the northwest coast. These warm dry systems result in only 10 to 15 percent of the annual precipitation falling during the summer. Long term climate is part of the biophysical environment. Short term climatic events like floods or drought are a disturbance. Even daily climatic fluctuations like the passage of dry cold fronts can drastically alter fire behavior, increasing the severity of the disturbance.

Habitat Type Groups (HTGs) - Habitat types, or potential vegetation groups, are a useful way to group lands capable of supporting similar plant communities in the absence of disturbance. Habitat types tend to have predictable patterns of disturbance, succession, and productivity, although topographic setting of the habitat type group (Vegetation Response Unit) may also strongly influence disturbance and forest succession. Habitat types have been grouped for this assessment after Applegate et al. 1995. Habitat type groups are shown in Map 4. Where field data were not available, the habitat type group was predicted for each stand using a terrain model.

Vegetation Response Units (VRUs) - VRUs are broad ecological land units that display unique patterns of habitat type groups (potential vegetation) and terrain. VRUs have similar patterns of disturbance and successional processes. Patterns of plant community composition, age class structure, and patch size tend to fall within certain ranges for each VRU. VRUs were used in this assessment to estimate resource capabilities, ecological integrity, and responses to natural and human caused disturbances. The components used to build the VRU classification system are habitat type groups (potential vegetation), landform, and presettlement disturbance processes (like fire regimes). They are basically a product of geology, landform, climate, and soil. Brief descriptions of the VRUs for the subbasin are contained in Chapter 3. VRUs are displayed in Map 5.

Aquatic Landtype Associations (ALTAs) - ALTA's are used in this assessment to characterize the stream settings within the subbasin. They are shown in Map 6. This map displays historic aquatic settings that consider both terrestrial (fire, erosion) and aquatic disturbance regimes (runoff character, flood timing and how channels process peak flows and sediment inputs). ALTAs are similar terms in some respects to VRUs. ALTAs consider not only landform, geology, and vegetation, but weigh elevation fairly heavily because of the role of ground water temperature and base flows in limiting aquatic habitats, and the relative significance of rain on snow at lower elevations, and sustained runoff at higher elevations. ALTAs are built looking at not only the component landforms, but the included channel systems, in particular, their size and gradient.

Ecological Reporting Units (ERUs) - In a process similar to that used in the Interior Columbia Basin project, the South Fork Clearwater Subbasin was divided into 13 geographic areas or Ecological Reporting Units (ERUs), which provide structure for describing where conditions occur and a sense of place. The assessment used ERUs, HTGs, VRUs, and ALTAs to describe and locate biophysical environments, characterize ecological processes, discuss the effects of past management activities, describe present social and biological trends, and to recommend future management strategies to achieve sustainable landscape conditions. The subbasin includes the following ERUs: Camas Prairie, South Fork Canyon, Meadow Creek, Cougar-Peasley Creek, Silver Creek, Newsome-Leggett Creeks, American River, Red River, Crooked River, Tenmile Creek, Wing-Twentymile Creek, Johns Creek, and Mill Creek (Map 7). In order to clarify and better describe the management themes in Chapter 4, some ERUs have been further subdivided to account for measurable and significant biophysical differences within an ERU.

Historic Range of Variability

Ecosystems are not static and their conditions vary over time and space. The historic range of variability describes the dynamic nature of ecosystems. The historic range of conditions found in a given setting is used to understand the likely range of conditions found under natural disturbance regimes. A key assumption of this concept is that when systems are pushed outside their normal range, there is increased risk that biological diversity and ecological function may not be sustainable. In the South Fork assessment, existing landscape conditions were compared to their historic range. Historic was defined as the time period prior to 1850. Since documentation covering the historic period is limited for the subbasin, it was necessary to estimate the range of historic conditions by extrapolating from more recent documentation and photos and applying scientific principles related to what we know about disturbance regimes.

Plant Succession

Succession is the progression in which plant species dominate a plant community over time after a major disturbance. Typically, many species will invade a site after a wildfire or harvest, but some will assert dominance early in plant community development, like fireweed or lodgepole pine. Later, other species will assume dominance, like subalpine fir or grand fir. Subsequent major or minor disturbances may retain a plant community in its current successional state (like a low severity fire), return succession to an early state (like a stand replacing fire) or affect some plants differently than others (like root disease which may kill grand fir and leave western white pine).

Landscape Disturbance

A disturbance is an event that causes a significant change from the normal pattern in an ecosystem; examples include fire, flood or drought (Pickett and White, 1985). Disturbance regime refers to the frequency, severity, scale and other attributes of a recurring disturbance (Hobbs and Huenneke, 1992).

Plant and animal species have typically evolved adaptations to survive in the disturbance regime typical of their environment. An example is the seed of lodgepole pine, which may be released from its cone only when the cone is heated by a hot forest fire. The trees are killed; the species is sustained. Another adaptation is the migratory life history of many fishes, their tendency to occupy different areas of a stream or different streams during spawning, rearing, and adult life, and their tendency to stray into new streams (Rieman and McIntyre, 1993). All these are behaviors that help them avoid unfavorable habitats and find and use favorable habitats in an environment where favorable habitats shift in space and time with fire, flood, and other natural disturbances.

When humans add an additional disturbance regime of timber harvest, road building, grazing, and other impacts on streams, and apply that regime across most of the landscape, the scale and ubiquity of disturbance dramatically alter the environment to which some fish and wildlife species are adapted.

> **Understanding the effects of changed disturbance regimes for terrestrial and aquatic systems is emphasized throughout the assessment. Restoration of the pattern of disturbance appropriate to a given setting was a key consideration in developing management themes and recommendations.**

The following events are some of the more recognized disturbances that have shaped landscape conditions in the subbasin:

Natural Disturbance

Fire - Fire events of variable frequency, severity, and extent affect vegetation patterns over time and space. The significance of wildfire in presettlement times can scarcely be overestimated as a key shaping element of the landscape. Presettlement fire regimes were mapped based on potential vegetation and terrain. They are shown in Map 8. Areas of frequent and very frequent fire were present in 25 percent of the subbasin. Descriptions by Leiberg (1898) and others (USDA Forest Service, 1911) indicate that near the turn of the century, about 30-40 percent of the basin had been burned within the last 20 to 40 years (Map 9). This was probably a typical condition during the last two thousand years of relative climatic equilibrium.

Because of the level of historic fire disturbance, seral grasses, forbs, shrubs and tree species were present to a greater degree than occurs today in many VRUs. In comparison, only 4 to 8 percent of the subbasin has burned from 1920 to the present. This decrease is a result of successful fire suppression. Fire history from about 1870 to 1940 is shown in Map 10. Fire history from 1940 to the present is shown in Map 11. The amount of fire disturbance in the basin ranged from about 2 to 30 percent per decade during the presuppression era. This is likely an underestimate, since low severity fires were not mapped.

Volcanic Eruptions - The eruption of Mt. Mazama (now Crater Lake) 6700 years ago precipitated a fall of volcanic ash that has formed an important surface soil material. The ash's ability to hold moisture and resist erosion has increased soil productivity where it is present. The frequency and severity of volcanic eruptions are hard to predict, and ash as a soil resource must be considered irreplaceable.

Floods - Floods can also be characterized by their frequency, severity, and extent. Flood effects vary considerably depending on the stream channel type and valley setting. Floods in unconfined valleys with low gradient, meandering streams typically dissipate energy over low streambanks and across a wide floodplain. Floods in confined valleys with high gradient streams are typically high energy events, and can result in stream channel scour. Small streams can be subject to floods from regional-scale snowmelt or rain-on-snow events, or localized rainfall. Larger rivers, such as the mainstem South Fork, are usually only responsive to regional events, such as spring snowmelt or widespread rain-on-snow, rather than localized summer thunderstorms. Road construction and other activities in floodplains can reduce the ability of the floodplain to dissipate flood energy, thus, increasing the impact of flooding on stream channels and aquatic habitats. Flood frequency may increase with harvest, fire or road drainage systems, which shortens the time it takes water to reach a stream channel after rain or snowmelt.

Insects and Diseases - Common insects and diseases which play a role in forest succession processes in the subbasin include bark beetles, defoliators, stem decays and root rots. Pathogen activity often advances forest succession by favoring shade tolerant tree species. Their activity can benefit ecosystems by promoting woody debris recruitment, providing food for many bird, insect, and small mammal species, recycling nutrients, or creating forest openings that increase habitat diversity. Native pathogens and insects played a key part in creating the diversity of forests which were present at the time of European settlement (Hann and Hagle, 1993).

Detrimental effects can also result where pathogens reduce existing shade to streams, cause the significant decline or loss of a species or structural stage in the landscape, or promote a rapid increase of fuel loadings, placing a large area at risk to severe fire. The level of activity for any particular pathogen changes through time and depends on existing vegetation conditions and climatic conditions. The ICRB Science Assessment concluded that forests in the Interior Columbia River Basin have become more susceptible to outbreaks of insects and diseases, because of increased stand densities and increasing dominance of more disease-susceptible late seral species. These changes in vegetation have occurred in the South Fork Clearwater Subbasin, as well.

Human Disturbance

Timber Harvest - Timber harvest is a man-caused disturbance that has a measurable frequency, severity and extent. In the South Fork, harvest has occurred since the 1860s, but has been well documented only since about 1950 on National Forest lands. The history of harvest on National Forest lands in the subbasin is shown in Map 12. The percent of the National Forest lands in the subbasin affected by harvest per decade has varied from less than one percent to about 6 percent. This is equivalent to a 167 to 1000 year return interval for the subbasin. The severity of harvest compared to fire has been greater, because of the past emphasis on clearcutting. The pattern of harvest compared to fire patterns has been more uniformly distributed across the landscape, in small patches (Compare Maps 12 and 10).

Roads - Roads have no natural equivalent as a disturbance regime. Their impacts are greatest at the time of construction, but continue throughout the existence of the road. The initial disturbance may be a source of sediment into nearby streams, may constrain the stream channel where roads occupy the floodplain (Map 15), or may reduce stream shading by removing trees from the streamside zone. Roads and their ditchlines may route water and sediment to streams more rapidly and efficiently than a natural channel system. They provide a disturbed substrate that invasive annual plants and weeds can readily colonize. They may alter movement patterns of larger animals or act as barriers to movement of some plants and smaller animals. They provide convenient access for human uses. These uses may have favorable or unfavorable effects on ecological conditions.

The existing road system is shown in Map 13. The ICRB Science Assessment concluded that high road densities were a strong predictor of loss of aquatic integrity, whether because of direct road impacts, or because of the association of roads with other development. Road density can be used as one measure of the degree to which episodic (pulse) disturbance, characteristic of many natural systems, has been changed to a constant (press) disturbance, which is not natural to many aquatic systems. Road density classes are shown by subwatershed in Map 14. This includes all known and inventoried existing roads on National Forest lands. The identification and inventory of roads is a continuing process.

Mining - Mining may occur as a one time or repeated disturbance. Mining activities can have long lasting consequences for local landform, stream channel morphology, and streamside plant communities. Map 15 shows where historic mining activity significant enough to alter stream channel and valley attributes has occurred in the subbasin. Effects of historic mining are still evident in the subbasin. Placer mines continue to erode and former meadows with meandering channels (like Crooked River) continue to exhibit poorly revegetating dredge piles**.**

Grazing - Grazing of herbaceous and woody vegetation occurred historically from wildlife and occurs today from native and introduced animals, including domestic livestock. Historically, grazing disturbance varied with grazer populations and forage levels that changed with plant community composition, climate, and predator population levels. Presettlement grazing patterns could be locally intense, but seldom of long duration. In contrast, season-long grazing of large numbers of sheep and cattle occurred in the early twentieth century on both primary range and in areas where fires had created transitory range. Shifts in plant community composition and vigor have occurred, mostly in streamside meadows and bunchgrass habitat types.

Watershed Dynamics

The soils, landforms, and streams in the subbasin are the result of numerous geologic and climatic events, including a general regional uplift of the northern Rocky Mountains and several episodes of glaciation and climate change. The soils, landforms, and streams have developed and adapted to a wide range of runoff events from spring snowmelt, rain-on-snow, midwinter flash flows, and thunderstorm runoff. Typically, rain or snowmelt in the watershed will quickly infiltrate soils and subsoils because of the surface ash cap.

Streamflow Regime - The hydrography of the South Fork Clearwater River reflects the annual precipitation and temperature patterns. Precipitation in the subbasin ranges from 25 to 50 inches (University of Idaho, 1993). Ten percent of the annual precipitation in Kooskia falls as snow, whereas 40 percent of the precipitation in Elk City is snow (Finklin, 1983). Annual runoff from the South Fork Clearwater subbasin averages about 12 inches, as measured by the USGS stream gage at Stites. Mean annual streamflow is 1,060 cubic feet per second (cfs). May is the highest streamflow month, with an average of 3,370 cfs. September is the lowest month, with an average of 258 cfs.

The South Fork Clearwater River typically experiences annual flood peaks during the period of late April, May, or early June. An average spring runoff peak at Stites is about 5,000 to 7,000 cfs. The largest flood of record was on June 8, 1964, with an estimated peak of 17,500 cfs. Floods occasionally result from snowmelt or rain-on-snow between November and March. An analysis of peak flow records at Stites shows that 15% of flood peaks occurred during this period. Historic gaging station records upstream, near the Forest Boundary, show that only 5% of flood peaks occurred during these months. Yet farther upstream, near Elk City, only 3% of flood peaks occurred during these months. These figures clearly show the transition of climatic conditions from the lower to upper parts of the subbasin, as well as the relative dominance of peak flows during spring runoff.

The major tributary streams in the upper reaches of the South Fork Clearwater (e.g. American River, Red River, Crooked River, and Newsome Creek) have a runoff regime very similar to the main river. They each drain a large area of rolling upland terrain. Because of the elevation of these tributaries, climate, relatively deep soils, and moderate topography, they typically do not have a flashy response to storms.

The runoff regime of tributaries between Newsome Creek and the Forest Boundary in the lower part of the subbasin is relatively complex, depending on their size, elevation, and landforms. For example, Johns and Tenmile Creeks drain high elevation terrain in their headwaters and mid to low elevation breaklands in their lower reaches. Because of the high elevation headwaters, they often peak several weeks later in the spring than the upper subbasin streams. These two streams also provide significant cool water input to the mainstem later into the summer. Medium-size, mid elevation tributaries, such as

Silver, Mill, Twentymile, and Meadow Creeks have a similar runoff regime to the major upper basin streams described above. The smaller tributaries in this reach of the South Fork Canyon often originate on low elevation breaklands that are subject to winter rain-on-snow events or spring and summer thunderstorms. These events can produce localized floods and debris torrents.

The major tributaries to the lower South Fork (below Butcher Creek) originate on the Camas Prairie and have a significantly different runoff regime than streams in the mid and upper parts of the subbasin. They often have their annual peaks in the midwinter, associated with rain-on-snow or rapid snowmelt events. General spring rains can also produce peak flows in these streams. Low flows are achieved earlier in the season, and thus, last longer overall than upstream tributaries.

Stream Channel Types - Channel types are a useful way of classifying streams based on observable features that have process and functional implications. Basic characteristics that distinguish channel types include thread, entrenchment (access to floodplains), sinuosity, width to depth ratio, gradient, and substrate size (Rosgen, 1994). Channel types are significant in that various stream types process energy (i.e. water) and sediment in different ways. A given set of disturbances, such as flood, drought, channelization, or changes in sediment yield can have widely varying effects depending on the channel type, as well as the magnitude of the disturbance. Within the subbasin, channel types are generally associated with the landscape setting and size of the stream. Channel types are described and diagramed in Appendix C. Although not directly used in the Rosgen classification, the concept of valley confinement is important. This term refers to the width of the valley floor relative to the stream width. Natural streams flowing in unconfined valleys are generally meandering, relatively low gradient, have substantial floodplains, and are free to migrate across their valley floor over long periods of time. Conversely, streams flowing in confined valleys are usually more linear, have a steeper gradient, have discontinuous floodplains, and tend to remain in place over time.

The upper part of the South Fork Subbasin is dominated by low relief, rolling uplands and convex ridges (ALTAs 1, 4, 6, 9, and 17). These landforms typically contain relatively steep, first and second order headwater streams flowing in confined valleys. The channel types are typically A and B and these streams have substrate composed of gravel and cobble. The headwater streams transport sediment with relatively high efficiency to lower gradient third to fifth order streams. These lower gradient streams often flow through flat valley bottoms and have high sinuosity, unless altered by activities such as dredge mining. Within these flat valley bottoms, channel types are generally C or E, with B channels predominating in more confined reaches. Substrates in the lower gradient reaches include more sand and gravel. These wide valley segments are subject to frequent overbank flooding during spring runoff and are associated with some of the highest potential anadromous spawning and rearing habitat in the subbasin. Examples of these streams include Red River, Newsome Creek, American River, and Crooked River.

In the middle part of the subbasin, from Tenmile Creek to the Forest Boundary, the channel pattern within tributary watersheds is more complex The larger tributaries typically have steep low order headwater channels (A channels), relatively flat, wide valleys in mid-elevation channels (C or E channels), and steeper stream channels in confined canyons (A and B channels) closer to the mainstem South Fork. The low elevation, steep channels are associated with breaklands (ALTAs 3 and 8). The lower reaches of these streams have larger cobble and boulder substrate and transport water and sediment quickly to the mainstem. Examples of these streams include Johns, Mill, and Meadow Creeks. Small streams on the low elevation breaklands are typically A channels, and have quick response to rain-on-snow events or spring and summer thunderstorms. These channels are quite prone to debris torrents and are shaped by those events.

The lower part of the subbasin is dominated by the Camas Prairie (ALTA 16), and has more low gradient streams with silt, sand, and fine gravel substrate in their headwaters. Channel types are commonly C, E, and B. These streams become steeper and their valleys more confined as they cut into the low elevation breaklands (ALTA 7). The substrate in third to fifth order streams is predominately gravel and cobble, and the channel type is typically B or C. Large amounts of bedload movement is common in these reaches and this material is readily delivered to the lower mainstem South Fork, as evidenced by accumulation of large alluvial fans at their mouths. These systems respond quickly to midwinter snowmelt and rain-on-snow events, frequently causing localized flooding.

The mainstem South Fork Clearwater River begins at the confluence of American and Red Rivers. From this point to about Tenmile Creek, the mainstem is a relatively low gradient riffle/pool stream dominated by gravel and cobble substrate. In this reach, it is typically a C channel. It has been highly altered by dredge mining and the placement of State Highway 14. From Tenmile Creek to Mill Creek, the mainstem is steeper, more confined, and the substrate is dominated by boulders and cobbles. The channel type is typically A, B, or G. This is a high energy reach through which sediment is readily transported. From Mill Creek to just above Threemile Creek (below the Forest Boundary), the river alternates between relatively flat, unconfined reaches and steep, tightly confined reaches. The channel type varies widely, with reaches definable as A, B, C, or G channels. It also changes direction, flowing nearly due north. From above Threemile Creek to its confluence with the Middle Fork Clearwater River at Kooskia, the South Fork is a relatively flat, unconfined riffle/pool channel with gravel and cobble substrate. The channel type is predominately C. This reach tends to be aggradational, with fine sediment depositing in the relatively few pools, and gravel and cobble depositing from upstream sources and at the mouths of tributaries. This lowest reach of the river has also been partially confined by dikes, most notably in the vicinity of Stites and Kooskia.

Hydrologic Zones - By combining the concepts of runoff regime and channel process, four basic hydrologic zones can be described within the South Fork Clearwater Subbasin. These are as follows:

Zone 1 - High Elevation Mountains - This includes those areas above about 6,000 feet, often on glaciated landforms. It includes ALTAs 1, 2, and 5. Annual precipitation is typically 40 to 60 inches. High snow accumulations and relatively late, prolonged snowmelt are common. Stream channels are highly variable within this zone ranging from very steep, confined headwater streams to relatively flat channels located in glaciated valleys. Channels are typically first to third order. This zone is best exemplified by upper Johns and Tenmile Creeks.

Zone 2 - Mid Elevation Rolling Uplands - This zone is typically between 4,000 and 6,000 feet elevation with relatively low relief, rolling hills. It includes ALTAs 4, 6, 9, 18, and 21. Annual precipitation is typically 30 to 40 inches. There is typically a moderate annual snowpack accumulation, followed by May snowmelt as the dominate peak flow process. Stream channels range in size from first to fifth order and can range from relatively steep, confined channels in headwaters to low gradient, unconfined streams in alluvial valley bottoms. This zone covers the largest portion of the South Fork Subbasin and is best exemplified by the watersheds of Red River, American River, Newsome Creek, and Crooked River.

Zone 3 - Low Elevation Breaklands - This zone is typically less than 4,000 feet in elevation and has steep sideslopes. It includes ALTAs 3, 7, and 8. Precipitation is typically 20 to 30 inches. Snowpacks are low to intermittent. The runoff regime is complex, with a mix of snowmelt, rain-on-snow, and rain resulting in peak runoff events, typically in early spring, but potentially anytime during winter, spring, or summer. Streams range from first order up to the mainstem South Fork. Streams have a wide range of gradients, but are generally well confined with steep valley walls. Debris torrents are relatively common in first through third order streams. This zone is found all along the South Fork Canyon.

Zone 4 - Low Elevation Plateaus - This zone is typically less than 4,000 feet in elevation and has relatively flat sideslopes. It includes ALTAs 15 and 16. Precipitation is typically 20 to 30 inches. Snowpacks are low to intermittent. The runoff regime is mixed, with snowmelt, rain-on-snow, and rain resulting in peak flows at various times. Early spring peaks are most likely, but midwinter peaks are not uncommon. Streams range from first through fourth order and are relatively flat and unconfined. This zone is best exemplified by the Camas Prairie.

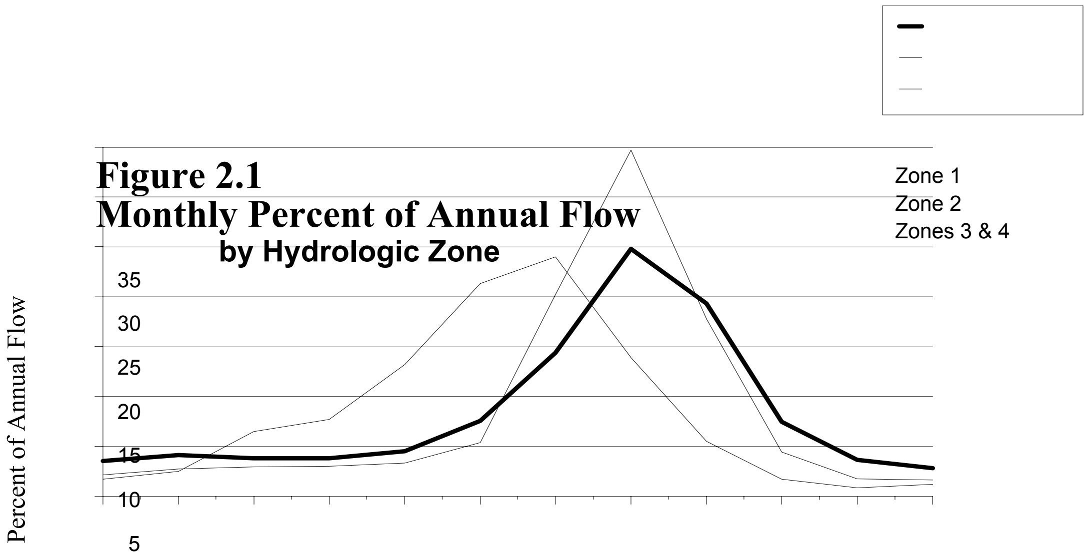


Figure 2.1 shows mean monthly hydrographs, expressed as percent of annual flow, for stream gages representative of the hydrologic zones within the South Fork Subbasin. The Zone 1 plot is from Johns Creek, Zone 2 is from the South Fork Clearwater River near Elk City, and Zones 3 and 4 are from Lapwai Creek. Although it is outside the South Fork Subbasin, Lapwai Creek was used as the example from Zones 3 and 4, since it is the only stream draining the Camas Prairie with a long term gaging record.

Since the figures are expressed as percent, the plots do not represent the relative magnitude of flow, but rather the distribution of flow over the water year (October 1 through September 30). For example, the relatively large percentage of flow in the month of May in Zone 2, does not necessarily represent a higher peak flow from this zone, but rather that the peak flow consistently occurs in the month of May. This is in contrast to Zones 3 and 4, where peak flows commonly occur during any of several months, depending on annual weather conditions.

Riparian Conditions - Riparian conditions include the role of vegetation near streams and the physical condition of streambanks, valley floors, and streamside slopes. Streamside vegetation buffers streams from temperature changes and sediment, provides organic material to the stream, and helps maintain stable streambanks. Depending on the channel type and size of stream, the relative magnitude of these functions can vary widely. For example, large woody debris is often a significant component of physical channel structure and stability in small to medium size streams, but plays a less important role in large rivers. Roads, fire, harvest, mining, and grazing may significantly affect the beneficial functions of riparian vegetation.

Physical riparian conditions are equally important to stream function. For example, channel and bank condition are key features in determining the effects of high streamflows. If banks are unstable or the stream has been downcutting, erosion is often accelerated and streams can be disconnected from their floodplains. The condition of streamside toeslopes will often determine whether they will be undercut by high streamflows, or deliver sediment through mass erosion.

Erosion Processes - Mass erosion, primarily geologic creep and, to a lesser degree, slumps and debris avalanches, is the dominant upland erosion process in natural forested landscapes. An exception to this is surface erosion after intense wildfires. Stream channel erosion is another important component, including both bed and bank erosion. Once material has been delivered to, or is mobilized in the channel system, it is subject to transport, storage, or deposition. The rates vary widely depending on the timing and magnitude of the delivery, channel type, size of stream, and climatic factors.

As early settlers began moving into the subbasin, surface erosion processes became more prevalent in areas of road construction, mining, timber harvest and grazing. Roads have increased surface and mass erosion rates beyond rates associated with natural watershed disturbances. An extensive network of roads has been constructed in a variety of settings including some sensitive areas such as stream bottoms and unstable landtypes. Roads built on unstable landtypes have resulted in some large-scale landslides.

The risk of management induced mass failures increases when road development and timber harvest activities are located on steep breaklands and mountain slopes. Roads and harvest units on landslide-prone terrain are shown in Table 3.17b.

The highest risk for increases in surface erosion are in areas where roads have been built on soil substrata with high erosion hazards or where timber harvest has occurred on soils with high surface erosion hazards. Areas of high risk of surface or substratum erosion are shown in Map 18. Roads and harvest in these settings are tabulated in Chapter 3 in Table 3.12.

Debris torrents are the rapid movement of water, rock, soil and vegetation down a stream channel. Areas with high risk of debris torrents are shown in Map 19. The risk is generally confined to the channels within these areas, although harvest or road building in shallow soils above these channels may contribute to that risk by increasing the water moving through the soil in these areas. Landslide prone terrain, as defined for Riparian Habitat Conservation Areas (RHCAs), is shown in Map 17.

Aquatic and Terrestrial Species Population Dynamics

Aquatic - Aquatic species, particularly the fish species considered in this assessment, have a population structure and function that has evolved within disturbance-based ecosystems. These disturbances include things like fires, floods, drought, vegetative succession, erosion, and channel changes. These species have developed alternate response strategies, such as resident and migratory life histories. The mix of these two strategies within subpopulations account for the specific setting in which populations have developed. The balance between local adaptation within subpopulations and the intermixing of genetic material within a metapopulation, is another example of disturbance adaptation. Additionally, the intermixing within a metapopulation provides for refounding or rebuilding of populations that have been affected by local disturbances.   The long term viability of these species is dependent on their ability to sustain these types of adaptive population dynamics.

Terrestrial - Population dynamics of terrestrial wildlife species can be explained by the net result of numerous interacting variables including habitat suitability, quality and productivity, natality rates, mortality rates (both natural and human induced), predation, inter-species competition, population densities as well as influences produced by environmental pollutants or contaminants. The individual variable that applies the greatest relative restriction on growth or viability of a given population is called the population limiting factor.

Social Concepts

Human Population Dynamics

Human population dynamics can include a variety of factors: age distribution, population trends, migration, population life-styles and population location. An analysis of population dynamics can be very informative in assessing future demands that are likely to be placed on natural resources.

Sense of Place

Place is how people relate to and understand an area. People's perceptions of place give that area special meaning to them, their community and their culture. Research shows that place attachment is passed down through generations, becoming part of people's heritage. Place is an integral component of community life because collective definitions of socially important places help to form and maintain community bonds and priorities. This assessment identifies special places within each ERU.

Recreation Opportunity Spectrum

The Recreation Opportunity Spectrum (commonly called ROS) is a framework that is used to inventory and communicate the land's recreational attributes. The size of area, distance from roads or trails, and degrees of naturalness are some attributes considered when classifying settings for recreation potential. Examples of ROS categories found in the subbasin are: Rural, Roaded Modified, Roaded Natural, Semi-Primitive Motorized and Semi-Primitive Nonmotorized, and Primitive. ROS allows the land manager to identify and categorize a variety of recreation areas that will appeal to people with varied desires and recreational expectations. The recreational user can then choose from a range of possible recreation settings, dependent on their individual desires, equipment and skills.

Timber Dependency

Timber dependent communities were previously defined as those in which primary forest products manufacturing facilities provided 10% or more of the total employment in the community. This list was updated in 1987. The ICRB Science Assessment assessed 66 communities on the 1987 list to determine which ones should still be considered timber dependent. The scientists added 2 additional criteria: they eliminated communities that were within 50 miles of other towns with at least 10,000 residents. They also eliminated the communities that were located within the 15 recreation counties in the Columbia Basin. In the entire Columbia River Basin, 29 communities were considered timber dependent. Three communities within the South Fork assessment area were among the 29: Grangeville, Elk City, and Kooskia.

Columbia River Basin Assessment Socioeconomic Indicators

Economic resiliency ratings were determined by measuring the diversity among the employment sector of an area. High economic resiliency equates to areas where people have ready access to a range of alternative employment opportunities if specific firms or business sectors experience downturns. The high economic resiliency areas are usually associated with areas having larger populations.

Social Resiliency ratings were measured using 4 factors: civic infrastructure (i.e. leadership and preparedness for change), economic diversity, social and cultural diversity (i.e. population size and mix of skills) and amenity infrastructure.

Life-style Diversity ratings were based on a life-style segmentation system called PRIZM. This model describes peoples life-styles by an analysis of household characteristics combined with consumer purchasing behaviors. The two primary criteria defining life-styles are affluence and residence (urban vs. rural). PRIZM describes 62 life-styles located in 12 major groups each representing about 1.5% of the nation's population. Three examples of life-style segment labels are: middle class rural families, rural farm town and ranch families, and low income, older rural couples. For each life-style segment, inferences can be made concerning income and leisure activities. Although these are generalizations, the information can be very helpful in determining natural resource use trends and levels.

Socioeconomic resiliency is a composite rating which combines 3 factors: population density, economic resiliency and life-style diversity. This rating provides a relative measure of how vulnerable an area is to change. It is important to note that socioeconomic resiliency has no correlation to economic or social well being. Indeed, some of the highest per capita income levels occur in areas with low ratings.

In response to the 1998 Interior Appropriations Bill, the ICBEMP has completed and released a supplemental economic and social report on March 3, 1998. This report examines the economic and social conditions of 543 communities in the Upper Columbia River Basin. Unfortunately, this report was released too late for the findings to be included in this landscape assessment.

Scenery Management System

The Scenery Management System (SMS) evolved from and replaces the Visual Management System (VMS). High quality scenery, especially scenery with natural appearing landscapes, enhances peoples' lives and benefits society. The Scenery Management System presents a vocabulary for managing scenery and a systematic approach for determining the relative value and importance of scenery in a national forest. Ecosystems provide the environmental context for this scenery management system. The system is used in the context of ecosystem management to inventory and analyze scenery in a national forest, to assist in the establishment of overall resource goals and objectives, to monitor the scenic resource, and to ensure high quality scenery for future generations.

Urban Interface

Urban interface refers to the people-wildlands interaction risks. Such risks can be thought of in two types. First, there are the risks to the ecological integrity of an area when the demands of people outstrip the capability of the ecosystem to absorb such impacts. Second, peoples' personal assets and the elements they value may be put at risk as human habitation near or within the wildland setting increases. An example is the risk to private property assets near or within the wildland setting by wildfire.

Chapter 3 - HISTORIC AND EXISTING CONDITIONS

Interior Columbia River Basin (ICRB) Findings

The ICRB Science Assessment evaluated conditions and trends for 144.2 million acres in the Interior Columbia River Basin. The South Fork Clearwater Subbasin lies within the Central Idaho Mountains Ecological Reporting Unit, forest and range clusters 3. Some of the ICRB Science Assessment findings applicable to the South Fork Subbasin are noted below.

General Findings

- Survey research suggests that the public prefers to work with the federal agencies and others having management authority, rather than relying on legislation or court cases, to achieve mutually desirable conditions.
- The public continues to show strong support for the environment and would favor protection over economic growth, if forced to choose. Many people are still not able to define ecosystem management and those who can define it, doubt the agencies' ability to implement it.
- Rural towns are less likely than urban residents to favor strengthening the federal role in resource protection. The property rights and "taking" issues are important to many rural residents.
- Recreation in the Interior Columbia River Basin is highly valued at the regional, national and international scale. Recreation use on FS/BLM lands is expected to double in the next 30 years.
- Opportunities for cutting Christmas trees and firewood, and picking mushrooms and berries are expected to decrease from overuse, especially on federal lands close to metropolitan areas.
- The Interior Columbia River Basin contributes 10% of the total United States timber harvest from both private and public lands, down from 17% in 1986. This is expected to decline to 5% by the end of the decade.
- Dependency on FS/BLM lands for livestock forage range from 1% to 11% depending on the region; the average is 7%. The Basin accounts for 2% of the cattle sales nationally. Mining is important in 6 counties in the Basin. Mining accounts for 0.45% of the employment in the Basin, which is less than the national average of 0.66%.
- Increases in human population predicted for the Northwest suggest that demands on ecosystems and public resources will continue to grow.
- The past decades have seen rapid population growth and the evolution of what was a mature, resource based economy into a diverse economy oriented toward technology, transportation, and service sectors.
- The most significant negative effects in moving away from a resource based economy will be experienced by people employed by the timber industry in the basin.
- Meaningful dialogue through an effective consultation process is an important issue among tribes. Consultation is not a single event, but a process that leads to a decision.
- Timber harvest patterns, along with exclusion of fire, have converted much of the late-seral vegetation communities to mid-seral communities as old overstory trees have been lost.
- The integrity of riparian vegetation and its extent along rivers has been changed and fragmented throughout the Basin in response to forest conversion and streamside disturbance.

- The composition, distribution, and status of fishes within the Interior Columbia River Basin is very different than it was historically. Although much of the native ecosystem has been altered, core areas remain for rebuilding and maintaining native aquatic systems.
- Increasing road densities are correlated with declining aquatic habitats.
- Maintenance and restoration of aquatic ecosystems are important goals. Decisive actions are required to stop further alterations and restore areas that are degraded.

Specific Findings and Subbasin Assessment Responses

The ecological integrity and socioeconomic resiliency ratings assigned to South Fork Subbasin from the ICRB Science Assessment are shown below. These ratings are reviewed as part of the South Fork Clearwater assessment. Responses were developed if the ratings or characterizations were incomplete, contrary to those found with the South Fork Landscape Assessment or where further explanation was needed. The subbasin assessment responses are shown in bold letters following the ICRB Science Assessment findings.

- The ICRB Science Assessment rated forest integrity as **low** based on tree stocking levels, presence of exotic species, snags, down wood, seral species, and tree size classes, and disruptions to hydrologic and fire regimes. A forest system that exhibits high integrity is defined as a mosaic of plant and animal communities consisting of well-defined, connected, high quality habitats that support a diverse assemblage of native and desired nonnative species, the full expression of potential life histories and taxonomic lineages, and the taxonomic and genetic diversity necessary for long term persistence and adaptation in a variable environment. Areas with most of these elements were rated high and those with the least were rated low.

  Forest integrity is considered to be low to moderate in the subbasin. Highest departures from historic composition and structure were found in low elevation forests in the ICRB Science Assessment. The area occupied historically by ponderosa pine in the South Fork Subbasin was actually less than portrayed in the ICRB Science Assessment. Larger areas of Douglas-fir and lodgepole pine were historically prevalent. In these types, departures of structure (age class distribution) are the primary changes from historic. The loss of whitebark pine, although poorly documented, appears to be greater in the South Fork in terms of proportion of the community type affected, than changes in ponderosa pine, and will be less easily reversed.

- The ICRB Science Assessment did not display range integrity for the South Fork Subbasin, because of the relatively low proportion of rangeland. However, the assessment concluded for the area in which the subbasin falls, that the low elevation forests and rangelands were typically among the most altered by livestock grazing, timber harvest practices, and exclusion of fire.

  Our ability to evaluate range integrity was poor because data on actual rangeland conditions in the South Fork Subbasin are not readily available. Based on degree of conversion to annual cropland, extent of disturbed grasslands, and establishment of noxious weeds, the ICRB Science Assessment findings were found to be correct.

- Hydrologic integrity was rated as **low** for the South Fork Subbasin. This rating was based on disturbance to water flow; bare soil and disturbances to soil structure; riparian vegetation; sensitivity of stream banks and hill slopes to disturbance; cycling of nutrients, energy, and chemicals; surface and subsurface flows; stream morphology; and recovery potential following disturbance. Again, surrogate indicators were used as needed. For human disturbance, these were roads, agricultural conversion, mining, and dams.

  Within the South Fork Subbasin, watershed condition (synonymous with hydrologic integrity) of tributaries spans the continuum of low to high integrity. The uppermost tributaries of the South Fork were generally rated low. Tributaries in the middle part of the subbasin, generally rated moderate or high. Tributaries in the lower parts of the basin generally rated low to moderate. Although not analyzed in detail, tributaries draining the

Camas Prairie would be expected to rate very low integrity, if compared to the tributaries draining forested lands.

- The ICRB Science Assessment rated aquatic integrity as **moderate** for the South Fork Subbasin. The rating was based on degree of presence of the full complement of native fish and other aquatic species, well distributed in high-quality, well connected habitats.

  In the South Fork assessment, we evaluated species distribution of native fish species (spring chinook, steelhead, bull trout, and westslope cutthroat), and the distribution of brook trout as a nonnative species. The assessment describes, by species, the inherent habitat potential across the subbasin, the current habitat condition, and the connectivity between habitats. Most of this analysis is contained in the species specific discussions in Chapter 3. Based on the criteria used to determine the rating of aquatic integrity in the ICRB Science Assessment, a rating of moderate for the South Fork Subbasin is appropriate.

- Terrestrial wildlife habitat was rated for the degree of departure from historic occurrence. The ICRB Science Assessment showed departures of 16 to 85 percent from historic. Departures generally included increases in mid seral community types, losses of early seral and late-seral in montane types, and increases in early seral and losses of mid and late seral in subalpine types. These habitat departures, when combined with moderate to high road densities have decreased available habitat for wildlife vulnerable to human disturbances, especially those relying on late or early seral forest structure and those species using small non-forest openings or canopy gaps.

  In the South Fork Assessment, the departures from historic occurrence were similar in pattern to those displayed in the ICRB Science Assessment. In general, habitats that displayed the greatest departures ranked as follows and implied the following priority actions: 1) create burned timber and increase early seral community types, 2) restore fire-climax ponderosa pine, 3) create/maintain early seral habitats for elk in montane types, and 4) maintain late seral habitats (pileated woodpecker, goshawk, fisher) .

- The ICRB Science Assessment rated ecological integrity as **moderate** for the South Fork Subbasin. The composite rating was estimated by comparing the component integrity ratings and knowledge of actual on-the-ground conditions.

- The social and economic counterpart to ecological integrity is resiliency, a measure of adaptability of social and economic systems. Economic and social resiliency for Idaho County were both rated as **moderate,** but when combined with social factors, including population density and life-style diversity (which was also rated as **moderate**), overall socioeconomic resiliency was rated as **low**. Communities with a low rating are less capable of adapting to changing economic and social environments.

- The ICRB Science Assessment rated reliance on Forest Service/BLM timber harvest for Idaho County as **high**.

- The ICRB Science Assessment rated reliance on Forest Service/BLM livestock forage for Idaho County as **low**.

Summary of South Fork Subbasin Conditions

The South Fork Clearwater Subbasin is a unique mixture of social and ecological conditions, functions and processes. From the review of historical and existing data, a summary of landscape conditions and trends is provided below. Immediately following this summary is a more complete description of the analysis and its findings.

Disturbance Processes

- Fire frequency has decreased to less than 10 percent of historical occurrence. Risk of severe fire has increased in some areas because of greater fuel quantity or continuity. Fires affected almost 6,000 acres per year before 1930, and since then have only burned about 400 acres annually.
- Presettlement disturbances like fire affected the pattern of vegetation because fires tended to vary in size, frequency, severity, and distribution; both randomly and in response to terrain and conditions before the fire. This pervasive disturbance produced both some predictable patterns and great heterogeneity. Fire suppression has reduced this heterogeneity. Timber harvest has created some age class diversity, but not to the degree that fire did. Further, the uniformity of harvest treatments and harvest unit size has resulted in less diversity at the landscape and stand level.
- Timber harvest has replaced fire as the dominant vegetation disturbance process, but this harvest has not sustained landscape pattern; specifically for elements like large pine, larch, and snags. Susceptibility to certain pathogens (root rots and spruce budworm) has increased with increases in grand fir and subalpine fir.
- Predominantly pulse disturbances of fire and flood have been supplanted by wide scale press disturbances of harvest and road-related sediment regimes that have impacted aquatic integrity.
- Historical sediment delivery and water yield were highly dependent on natural fire regimes. Current sediment delivery and water yield are more closely aligned with disturbances associated with road construction, timber harvest, mining, and grazing.

Aquatic

- Physical aquatic conditions in the South Fork Subbasin have changed substantially since the initiation of significant human disturbances in the 19th century.
- The most impactive alterations of upland conditions are probably the road development throughout most of the subbasin and the conversion to agricultural crops in the lower part of the subbasin.
- Stream channel and riparian conditions have also changed substantially.
- The most significant impact in the upper part of the subbasin is probably the dredge mining that occurred in most of the major upper tributaries, as well as the upper mainstem South Fork.
- Encroachment by roads and other developments are another significant impact on stream and riparian condition, as well as changes in streamflow and sediment regimes.
- There are still significant areas within the South Fork Subbasin where upland watershed, riparian, and stream conditions are relatively intact.
- The South Fork Subbasin contains a significant amount of habitat with high to very high potential to support the aquatic fish species assessed. The subbasin is an important area for fish species within the Columbia River Basin.
- The aquatic fish species remain widely distributed throughout the subbasin, their current distribution is probably very similar to the historic distribution in the subbasin.
- The abundance of all fish species has declined significantly from historic levels. The most conspicuous declines have been in the anadromous fish species and the larger fluvial resident fish.
- The greatest loss of habitat condition has been in the very high potential habitat in the upper subbasin, where there has also been the greatest alteration of historic disturbance regimes.
- The viability of the aquatic species in the subbasin is at risk, based on factors both within the subbasin and downstream (for anadromous fish).

Vegetation

- ❑ Conversion of foothills grassland on prairie and hill slopes to cropland, hay, and pasture, has been extensive on private lands.
- ❑ Annual grasses and noxious weeds have become established on grassland habitat types on low elevation steep south facing slopes.
- ❑ Forest succession, fire suppression, and timber harvest have resulted in declines in large open-grown ponderosa pine. Early seral, intolerant species like lodgepole pine and western larch, have also declined with fire suppression.
- ❑ Patch sizes are smaller on lodgepole sites and larger on moist grand fir sites, when compared to historic conditions.
- ❑ Whitebark pine is in serious decline from blister rust, fire exclusion and mountain pine beetle. Western white pine, never abundant in the subbasin, has also declined from blister rust.
- ❑ Grand fir, Douglas-fir, and subalpine fir have increased.
- ❑ Early seral structural stages, including forest openings, seedling and sapling, and pole stands, with snags and down wood, have decreased because of fire suppression. Medium and large tree classes have increased in most areas, except larch and ponderosa pine forests.
- ❑ Large patches of fire-killed snags have declined with fire suppression. Large diameter snags have declined where timber harvest has occurred.

Wildlife

- ❑ Several wildlife species have been extirpated from the South Fork Clearwater Basin in the last century, including Columbian sharp-tailed grouse, burrowing owl, and grizzly bear. Several more, such as mountain quail, white-headed woodpecker, and gray wolf have been nearly extirpated.

  In the South Fork Assessment, the departures from historic occurrence were similar in pattern to those of the ICRB Science Assessment. In general, habitats that displayed the greatest departures ranked as follows and implied the following priority actions: 1) create burned timber and increase early seral community types, 2) restore fire-climax ponderosa pine, 3) create/maintain early seral habitats for elk in montane types, 4) maintain late seral habitats (pileated woodpecker, goshawk, fisher) .

- ❑ The most important changes in forested wildlife habitats have been the loss of fire-killed trees due to suppression of stand replacing fires, loss of fire-climax ponderosa pine forest due to suppression of ground fires, reductions in early and late seral habitats, and loss of wildlife security areas from road and trail access.

  The species most affected by the changes in forested habitats include: black-backed woodpecker (lack of fire-killed/weakened trees), flammulated owl and white-headed woodpecker (loss of climax and old growth ponderosa pine), black-backed woodpecker, lynx, bald eagle and elk (reduction or quality loss of early seral habitats), and elk/lynx/fisher (concern for wildlife security due to human disturbance or mortality risks related to road and trail densities). The changes are consistent with the broad landscape characteristics and risks to ecological integrity recognized in Forest Cluster 3 (ICRB Science Assessment).

Socioeconomic

- ❑ Timber harvest has and continues to play an important economic role in supporting local communities.

- Recreation use of public lands is increasing and the need to maintain scenic integrity is also high.
- Recreation use is mostly associated with dispersed recreation activities such as hunting, fishing, camping, driving for pleasure and camping.
- Developed recreation facilities are mostly concentrated along the mainstem South Fork Clearwater and Red Rivers.
- Most of the subbasin's recreation users are from north central Idaho, however, in the fall, a significant percentage of the hunters using the subbasin are from out-of-state or other parts of Idaho.
- There are often conflicting requests for public access. Current processes for establishing road and trail restrictions may not be meeting the needs for resource protection or public use.

Nez Perce Tribe

Treaty Rights

Historically, the Nez Perce Tribe was one of the largest groups of native people within the Columbia Plateau region of the Pacific Northwest. They occupied lands over 13 million acres that included all of the Clearwater River drainage, the Wallowa Mountains, and the upper portions of the Salmon River drainage. The first treaty between the United States and the Nez Perce Indians was signed on June 11, 1855, establishing a 7.7 million acre reservation.

In 1860, gold was discovered within the Nez Perce Reservation near present day Orofino. This discovery resulted in a massive influx of miners which led to conflicts and disputes between the Nez Perce and settlers. The United States sought to negotiate another treaty. This treaty again reduced the size of the Tribe's reservation. Although this treaty was resisted by several Nez Perce leaders, it was ultimately executed on June 9, 1863. The reservation was reduced to about 780,000 acres.

A third treaty was signed between the Nez Perce Tribe and the United States. This document was formalized on August 13, 1863. One of the provisions in this treaty was the allotment of lands within the reservation to individual tribal members.

In 1887, the General Allotment (Dawes) Act established mandatory allotments of reservation lands. Individual parcels were divided among tribal members, usually in amounts deemed sufficient to practice an agricultural way of life. After allotting lands to tribal members, the remaining areas were opened to homesteading or purchase by settlers.

The process of the United States entering into treaties with Indian tribes was terminated by an act of Congress in 1871. However, formal agreements between the United States and Indian tribes were still needed. In an 1893 agreement, the Nez Perce ceded all the unallotted lands within the limits of their reservation to the United States. The allotment process affected tribal land holdings resulting in a checkerboard pattern of land ownership within the reservation. Today, the allotted lands make up the majority of the reservation lands. Presently, the Tribe and tribal members own about 90,000 acres of the approximate 780,000 acre reservation created in the Treaty of 1863. None of the subsequent treaties between the United States and the Nez Perce people altered or affected the rights reserved in the original 1855 treaty except for the lands reserved and ceded.

Tribal Organization

Like other Indian tribes, the Nez Perce aboriginally possessed attributes of a sovereign governmental entity. This sovereignty of Indian tribes was recognized by the United States and even earlier by some of the foreign governments which entered into treaties with the tribes. Although the full range of governmental powers were exercised by the tribal government, the form of government and its activities were different than what is common today. Today, the tribal government is founded upon the same inherent sovereign powers upon which the tribal government was based in prehistoric times. Presently, the Nez Perce Tribe operates under a constitution and by laws originally adopted in 1948.

The Nez Perce Constitution delegates the majority of governmental functions to the elected body of the Tribal Executive Committee. Tribal council members of the Executive Committee are elected, in staggered terms, by a vote from enrolled tribal members known as the General Council. The General Council meets twice a year to hear reports from the Executive Committee. There are also various subcommittees with responsibilities over issues such as fish and wildlife, natural resources, health and human services, and law and order. The Executive Committee also has an internal staff which is responsible for implementing policy direction. Department staff directors report to their respective subcommittee for guidance and program review.

Currently, there are over 3500 enrolled members of the Nez Perce Tribe. Elected leaders represent the Tribe in interactions with federal, state, and local governments as well as with other tribal governments on a broad spectrum of topics. The Tribe regulates the exercise of reserved treaty rights to hunt and fish by its members within and without the Nez Perce Reservation. It also has criminal jurisdiction over Indians within the reservations and civil jurisdiction over non-Indians whose actions affect the political integrity, economic well-being, or the health and welfare of the Tribe. The Nez Perce Tribal Executive Committee is obligated and committed to insuring a viable future for the Tribe and its members. This means providing a full measure of governmental services to the tribal community, protecting and preserving treaty rights and sovereignty, and securing a sound economic base for the Tribe.

Heritage Resource Protection

Numerous Nez Perce religious and cultural sites are identified and protected in the subbasin. In most cases, their locations are not available for public disclosure in order to protect the integrity of the sites. As part of the Nez Perce Forest Plan, upper Silver Creek was characterized as an important area to the Nez Perce Tribe for cultural and religious reasons. The interests of the Tribe were documented in an Executive Committee Resolution dated March 1986 which requested the Pilot Knob/Pilot Rock area be protected from any disturbance that would alter its pristine and natural state or disturb the conduct of Nez Perce religious rites. In response to that request, the Forest assigned management area standards to upper Silver Creek. Those standards included no timber harvest or road construction, management for semiprimitive recreation opportunities, and maintenance of existing roads and trails.

It has been a general practice of the Forest to consult with the Tribe on any proposed activities and decisions potentially affecting tribal interests. Conferring with the Tribe during the planning and implementation of projects is required by the Forest Plan and is fundamental to maintaining the current government to government relationship.

Occupation & Settlement

The assessment area has seen numerous changes in land use patterns through human involvement over the past 8,000-10,000 years. From its earliest Indian inhabitants who traveled through the region utilizing its resources, to the miners hoping to strike it rich, and the families which homesteaded and settled in the small towns, the subbasin witnessed several waves of occupation through time. Each group interacted with their surroundings to their benefit.

Prehistorically, Indian groups (mostly ancestral Nez Perce) occupied this area throughout their seasonal movements. The first trails were created by this movement along the rivers and streams, to hunting and gathering areas in upland settings, to adjacent areas such as the mountains and valleys of future western Montana, and to the Salmon and Columbia River country. The first Indians to occupy this area may have arrived 10,000 years ago.

The first Euroamerican people to investigate this area were fur trappers in the 1830s. They were followed by miners in the 1860s. These miners focused on placer gravel deposits which they worked by hand until the profits became too small. When the gravels were exhausted, Chinese miners came in to rework the deposits, recovering additional amounts of gold. There was also the occasional mining operation which utilized tunnels and shafts in their pursuit of gold and other metals. The majority of mining operations occurred in the 1800s and early 1900s. With this influx of people, new trails, wagon roads, and way stations were established. Some of these new trails and roads were developed along the existing prehistoric Indian travel routes.

After the gold fever subsided, the next generation of occupants were homesteaders including cattlemen, sheepmen, and farmers. This wave of settlement in the late 1800s and early 1900s, was mostly located in the western portion of the assessment area. Homesteaders constructed houses, barns, sheds, fences, and other types of improvements which they occupied year-round.

Forest Service presence in the region began in the early 1900s. Forest fire lookouts, ranger stations, and work centers were established across the subbasin. Numerous existing trails along with newly constructed trails and roads were brought under federal control.

Still more recently (post World War II), increased logging activities have taken place within the Forest. In the early 1940s, Potlatch Forest Inc. of Lewiston, Idaho, constructed a logging camp in the northwest corner of the assessment area near McComas Meadows. This camp was in operation until the early 1950s when Potlatch removed the structures and its equipment from this location.

Some of the early historic land uses on the Forest such as travel routes, camps, ranger stations, lookouts are shown in Map 20. These locations were important to the Nez Perce people, miners, homesteaders, and the early administration of the Forest. The subbasin continues to be a valued place for recreation, work, and spiritual renewal,

Communities

Attitudes, Values, and Collaborative Stewardship

Idaho County is the 19th most populous county in the State, but it ranks number one in total area. Over 83 percent of the county is federal land. Forest and wood products provide the majority of employment. Total civilian employment increased 3.8% from 1983 through 1993. Major employers include the school district, Forest Service, Idaho County, and St. Mary's Hospital (Idaho Department of Commerce, 1994).

While the Nez Perce Forest is developing many partnerships, most partnerships are project-specific, such as trail work, weed eradication, etc. The Forest and our communities are not yet to the point of understanding or participating in true collaborative stewardship. More collaborative approaches to making decisions can be arduous and time consuming, and all of the players must change their customary roles. For government, this means convening and facilitating, and shifting gradually to supporting responsibility by setting goals, creating incentives, monitoring performance, and providing information (Sustainable America, 1996).

The Council concluded that to meet the needs of the present while ensuring that future generations have the same opportunities, the United States must change by moving from conflict to collaboration and adopting stewardship and individual responsibility as tenets by which to live. The most important finding is the potential power of and growing desire for decision processes that promote direct and meaningful interaction involving people in decisions that affect them. While the attitudes and beliefs of the area residents appear to be supportive of such an approach, the knowledge of how to reach this may be lacking in both the Forest Service and the communities. However, the indication is that this is how we will be doing business in the future, and therefore, we need to begin gradually implementing these concepts into our normal mode of operation.

At the present time, the Forest Service and communities are involved in a number of activities and projects that are moving us in the direction of these goals. Through the Forest Service Rural Community Assistance program, the Nez Perce Forest has collaborated with communities to protect, recover, and display unique prehistoric animals discovered at a local site. Forest Service Economic Recovery Grants have also assisted local communities to provide industrial centers, develop business networks, upgrade infrastructure, and provide visitor services. These types of ongoing socioeconomic efforts are the base from which the Nez Perce Forest and the area communities will develop future collaborative stewardship efforts.

In the April, 1992, Nez Perce National Forest Perception Analysis, nine out of ten people felt that the Forest has been open in making its position known on various issues. The most frequently mentioned opportunity missed is involving the public and community more. Other frequently mentioned opportunities include more communication between the public and the politicians, and the need to develop more recreational areas.

There was little agreement on what to do to improve the management of the Forest. The most frequently mentioned suggestions include more public and local input and less political influence. One out of three people mentioned the need for balanced use. Other frequently mentioned issues, concerns or problems included the lack of timber sales and the need to preserve and protect what they already have. Those interviewed tend to feel that they have had little participation in the forest planning process.

Over half of those interviewed feel that the Forest Service is doing a good job in involving the public in the management of the forest. This study doesn't agree with the August, 1991, Demographic Study of the general public in the Nez Perce National Forest service area, which found that only one person out of four rates this as good.

While two out of five of those interviewed feel that the Forest Service is doing a good job of managing the natural resources of the Nez Perce National Forest in a balanced manner, a significant minority (one out of four) rates this as poor. The general public tends to rate the Forest Service somewhat higher.

In the publication Communications Planning for the Nez Perce National Forest, August, 1991, when asked about the most important issues, concerns or problems facing the Nez Perce National Forest, residents most frequently mention too much logging and clearcutting, the need for balanced use, and the lack of timber sales and logging.

Most residents agreed that the Nez Perce National Forest has a good mix of uses and that it is doing an adequate job of protecting endangered species. People also felt that the Forest should be more concerned with the wildlife in the forest and that it should develop more recreational areas. People didn't feel that there should be more roads in the Forest or that more areas should be made available for motorized recreation.

The respondents were about split between feeling that more timber should be harvested and that the Forest should be managed for wilderness values. More people feel it's a resource management agency than a timber management agency. They felt the Forest was only average in involving the pubic in the management of the Forest.

There are four major psychographic groups that should be considered and involved: pro-wilderness, pro-timber, anti-development, and pro-development. All four of these groups are represented within the general area of influence of the Nez Perce National Forest. This polarization of beliefs and values concerning public lands management presents a genuine challenge to both the federal land managers and residents of the area. This situation highlights the need to pursue meaningful collaboration as soon as possible.

Demographic Implications and Trends

The data for this section is available at the county and regional level, but not at the subbasin level. The subbasin is in the middle of Idaho County, which is in Idaho Region II. Although the data appears to be good, the reader will need to judge the adequacy of the county and regional data in relation to the South Fork Subbasin.

This section was primarily excerpted from the Clearwater Economic Development Association's 1996 and 1997 Overall Economic Development Program Annual Reports. Graphs and charts were adapted or derived from those two documents or the Idaho Department of Commerce 1994 document, County Profiles of Idaho.

Population growth in the region moderated considerably in 1995 to less than 1 percent growth per year, compared to the previous year's expansion of 2.2 percent. The rate of population growth slowed considerably in the region to 0.8 percent in 1996. Statewide, population growth decreased somewhat to 2.5 percent. The latest population estimate for Region II is 98,142. However, the trend in population for north central Idaho is upward, since it bottomed-out with a 1.9 percent decline in 1986. Growth peaked at 2.1 percent in 1994, while the state reached a crest of 3.3 percent in 1993. While the area population has recaptured younger workers, it lost in the 1980s, the total population is shifting disproportionately toward older people (Table 3.1). Since 1970, the population over 60 increased 49 percent, while the group under age 19 has fallen 16 percent. The current population estimate for Idaho County is 15,311 (US Department of Commerce, Bureau of Census).

Growth trends in north central Idaho show increasing disparity as the most rural areas experience an influx of new residents. An analysis by the Clearwater Economic Development Association (CEDA) in October, 1995, showed nine communities with populations less than 1,000 growing in excess of 4 percent per year since 1991. In addition, the unincorporated areas of each county are attracting a greater share of new residents. For example the unincorporated population in Latah and Idaho counties has exceeded the aggregate city population growth increases. Many of the people locating in the rural areas are self-employed or retirees on fixed incomes. Their overall contribution to job creating opportunities is minimal. However, the demand for local public services is increasing.

Table 3.1 - Population Age Change

Age	1970-1980	1980-1990	1990-1992
Median Age	28.4	30.3	36.5
Under 18 Years	38.7%	31.5%	27.9%
18 to 64 Years	51.3%	56.1%	56.5%
65+ Years		12.5%	15.6%
Persons Per Household	3.24	2.8	2.57

Although the number of older people is increasing, the fastest growing household size is three to five persons, which has nearly doubled since 1970. Households composed of one to two persons have declined dramatically to about half the 1980 number (Table 3.2).

Table 3.2 - Household Composition

Number of Persons	1970	1980	1990
1 to 2 Persons	49.4%	53.8%	27.9%
3 to 5 Persons	33.6%	40.2%	61.5%
6 + Persons	14.0%	6.0%	4.0%

Table 3.3 - Population Trends in Idaho County

Location	1970	1980	1990	1992
Cottonwood	867	941	822	852
Ferdinand	157	144	135	141
Grangeville	3,636	3,666	3,226	3,208
Kooskia	809	784	692	708
Riggins	533	527	443	460
Stites	263	253	220	215
White Bird	185	154	108	109

With concurrent increases in property values and in some cases, property taxes, financial and infrastructure capacity is filling in rural north central Idaho. Assessed taxable property values in Idaho County are within about one percent of the Regional and State average yearly growth (Table 3.4).

Table 3.4 - Assessed Taxable Property Values

Location	1993	1994	1995	Ave Yr Growth 1993-1995
Idaho County	458,344,383	518,815,865	572,660,032	11.8%
Clearwater County	299,697,162	351,478,103	420,600,800	18.5%
Latah	750,477,154	834,920,910	962,972,608	13.3%
Lewis County	154,849,623	167,319,875	189,539,488	10.7%
Nez Perce County	1,560,987,683	1,687,201,573	1,802,182,656	7.5%
Region	3,224,356,005	3,559,736,326	3,947,955,584	10.7%
State	34,531,928,150	38,355,570,010	43,839,862,281	12.7%

The region's labor force reached nearly 51,000 in 1996 (Table 3.5). Despite a 13 percent increase since 1990, the labor force has grown sluggishly in recent years averaging only 0.8 percent since 1994. The slow labor force growth is caused by a slowdown in population growth and perhaps discouraged workers dropping out of the labor force.

Table 3.5 - Labor Force

	Number of People in Labor Force					**Change in Labor Force**	
Location	1980	1990	1994	1995	1996	1980-1995	1990-1995
Idaho County	6,581	5,995	6,691	6,671	6,659	212	798
Region	42,516	44,877	50,159	50,906	50,930	8,608	6,247

Most people residing in Idaho County work within Idaho County. About one third of those working in Idaho County work in Grangeville, while 2/3 work elsewhere in the County (Table 3.6).

Table 3.6 - Place of Work Destinations

Location	Number of People
Idaho County (other)	2,700
Grangeville	1,476
Lewis County	405
Cottonwood	320
Clearwater County	87
Nez Perce County	61
Other or Unknown	1610
Total County Workers	6,659

Unemployment moderated somewhat in 1995. Although lower by historic standards, Idaho and Clearwater counties continue to exceed 10 percent unemployment and this trend since 1989 is increasing (Table 3.7). Dislocations in the wood products industry, dampened wage growth and escalated under employment will continue to compound the regional unemployment. Rural areas are more affected by lower incomes and a higher rate of job declines in natural resource based industries, than are the urban areas. Also, continued federal downsizing will adversely affect these two counties, with 16 percent of total earnings due to employment in federal government.

Through the first half of 1996, seasonally adjusted unemployment has trended near the 1995 average. Low unemployment rates of 3-4 percent in Nez Perce and Latah counties are a full employment signal and normally imply labor shortages and increasing employment costs, thus pressuring employers to locate new or better trained workers. Tight labor markets give workers bargaining power, but don't benefit unskilled workers. In Clearwater, Idaho, and Lewis counties, monthly unemployment is highly variable due to limited full-time opportunities and greater joblessness in the winter and early spring. Economic diversification would smooth the tremendous variance in unemployment in these natural resource dependent counties.

Table 3.7 - Yearly Unemployment Rates

Location	1980	1990	1994	1995	1996
Idaho County	12.7%	8.3%	11.1%	10.6%	10.4%
State	7.9%	5.9%	5.6%	5.3%	5.0%

Income and Well-being

Idaho's per person income ranking in 1994 slipped a spot to 39th in the United States, and remains only 84 percent of the United States average, as it has since 1980. Within north central Idaho, only Nez Perce County regularly exceeds the state average. The Idaho County per capita personal income in 1994 was 88% of the State average (Table 3.8). Per capita personal income includes government transfers and unearned income sources.

Table 3.8 - Per Capita Income

Location	1990	1993	1994
Idaho County	$13,594	$15,624	$16,027
State of Idaho	$15,301	$17,724	$18,272
United States	$18,666	$20,812	$21,699

Average annual wages or earnings per job stagnated across the region in 1995. While total average wages in the state increased 4.1 percent, the region slid to 0.3 percent. Factoring in price inflation this is a real decline in employment earnings. Idaho County was hit hardest in 1995 due to lower employment and reduced earnings in the federal government sector. A large reduction in lumber employment and earnings in the county due to the Idapine sawmill closure offset each other, slightly increasing the average lumber wage (giving reason to view average wages cautiously.) While government and timber jobs and earnings fell greatest in Idaho and Clearwater counties, other manufacturing earnings on average rose in these counties (Table 3.9).

Table 3.9 - Average Annual Wages Idaho Co.

Place of Employment	Amount
Lumber	$26,719
Other Manufacturing	$16,257
Construction	$18,061
Services & Misc.	$12,943
Finance, Insurance and Real Estate	$16,250
Transportation, Communication and Utilities	$25,365
Retail Trade	$11,530
Wholesale Trade	$21,111
Federal Govt	$28,040
State Govt	$27,120
Local Govt	$16,907
County Average	$19,148

Changes in the Area's Economy

The overall Idaho economy has performed quite well since 1988. Nonfarm payroll jobs expanded at a rapid pace of 4-5 percent annually and population increases put the state in the top three fastest growing in the nation. Within the past two years, the economy cooled off somewhat, but it is still robust compared to other states and is projected to grow at a sustainable rate above 2 percent per year.

Region II economic performance lags behind the state and other regions, since the beginning of Idaho's economic expansion in 1987. In 1995, nonfarm employment grew 1.5 percent. Recently released data for 1996 show a decline of almost 1 percent, the only region in the state to turn downward. Job loss in the five counties continues to be driven by reductions in lumber and wood products employment. However, service producing employment is not immune from reductions. Federal government administration, wholesale trade, and the transportation and public utility sectors have consolidated over the last few years leading to job declines. Bank mergers in the area mean the closure of more rural branches, which adversely affects financial services employment.

Strong job producers over the last few years include the small but well paying manufacturing sectors of industrial machinery (for example, precision machine tools, power driven hand tools) and transportation equipment (jetboats, engine and aircraft parts.) The fabricated metals sector (ammunition) has fluctuated, but trended upward. However, these sectors are not prevalent outside of Nez Perce County. Three sectors; services, retail trade and public education, dominate with 60 percent of total nonfarm employment. Service producing employment growth continues to sustain overall employment expansion in Region II.

Table 3.10 - Number of Non Agricultural Jobs in North Central Idaho

				Average Growth	Change
Industry	1996	1995	1994	1980-1995	1990-1995
All Non Agricultural	42,639	43,019	42,363	0.3%	276
Goods-Producing Industries	7,722	8,136	8,433	-4.3%	-711
Mining	254	234	257	-0.1%	-3
Construction	1,502	1,480	1,492	4%	10
Manufacturing	5,944	6,399	6,664	-5.5%	-721
Food & Kindred Products	154	203	183	-6.7%	-29
Lumber & Wood Products	2,454	2,749	2,932	-8.5%	-479
Paper & Allied Products	1,692	1,712	1,800	-3%	-108
Chemicals & allies products	12	12	11	4.5%	1
Fabricated Metals	689	759	778	-5.8%	-89
Industrial Mach. & Computers	210	199	183	7.1%	27
Transportation Equipment	41	40	28	22.7%	13
All Other Manufacturing	458	478	500	-4.3%	-42
Service-Producing Industries	34,917	34,880	33,928	1.5%	989
Transport, Comm.i, & Utilities	1,743	1,825	1,851	-3%	-108
Trade	9,994	10,172	9,932	0.3%	62
Wholesale	1,489	1,555	1,536	-1.5%	-47
Retail	8,505	8,615	8,392	7%	113
Finance, Insurance, & Real Estate	1,981	1,962	1,904	2%	77
Service & Miscellaneous	8,506	7,997	7,645	5.5%	861
Government	12,694	12,913	12,592	0.4%	102
Administration	4,172	4,369	4,421	-2.8%	-249
Education	8,522	8,542	8,167	2.2%	355

Economic Summary

The continued risks to regional economic stability include: 1) the dominance of natural resource industries and concentration in fewer firms, 2) further reductions in federal agency employment, particularly the Forest Service, 3) risks to transportation linkages such as rail and barge, and 4) the constraints of isolation. Several ways to offset these risks include:

- ❑ Diversification in manufacturing. The manufacturing job composition in the region is about 70 percent timber related. The other 30 percent is a mix of light manufacturing. Efforts to increase the light industrial base by another 10 percent would spread the base. Manufacturing centers, incubators and producer associations are some tools to increase the industrial mix. Secondary service opportunities to complement primary jobs are needed as well.

- ❑ Tourism development. Building on natural assets in the region for the service and trade sectors would further diversify the economy. Region II has not been as successful as other regions in building a tourism base. Efforts by promotion and economic development groups, including CEDA, are improving that situation through processes such as the Corridor Management Plan.

- Develop and promote the telecommunications infrastructure. Official job numbers don't capture hundreds of one to three employee businesses in cities and remote areas. The advent of telecommunications (computer, fax, modem, Internet) for small businesses has an unaccounted impact on rural economies offsetting the effect of isolation. Region II, however, is at a competitive disadvantage in the quality and cost of that access.
- Improve the region's roads. Transportation improvements on U.S. highways 95 and 12, including visitor facilities are critical to economic progress in Region II. Preserving linkages such as air, barge and rail are another priority.
- Many circumstances causing employment declines are outside of local factors. Federal government downsizing, banking and utility mergers and other off-site corporate decisions should not cloud local development efforts.

People-Wildland Interface

Risks to ecological integrity are affected in two ways. First, ecological integrity can be affected if or when the demands of people (for both commodities and services) outstrip the capability of an ecosystem, or if land use decisions limit the capability of an ecosystem. Second, the risks can be affected to the extent biophysical systems affect people, their assets and elements they value, especially at the people-wildland interface. The ICRB Science Assessment found that the risk to ecological integrity is generally higher in proximity to densely populated areas, and risks to people and their assets are generally higher in close proximity to wildland areas, than in agricultural or urban areas. Natural events occurring within wildland areas might prove risky to people, homes, and other assets people value that are associated with wildland areas. Floods, fire, road slumping, culverts plugging, deer and elk eating gardens and coyotes bothering pets are all examples of increasing risks to people and their assets associated with their proximity to wildland areas.

The ICRB Science Assessment assumed a symmetric relationship concerning the risks to the integrity of the wildland areas from human influence and the risks faced by humans living in proximity to the wildland areas. Road building, fishing, camping, hiking, wood cutting, berry picking, ORV use and development of recreation sites are all examples of activities that tend to increase in wildland areas in close proximity to population centers.

Risks to human assets from natural events in wildland areas and risks to ecological integrity from human use in wildland areas are not restricted to areas close to metropolitan areas. Rural areas where people reside (including some areas in the subbasin), as well as primitive areas where people are only visitors also have risks. Sparsely populated areas generally have fewer resources to assist in control of natural events such as fire, floods and insect outbreaks. The demand for USFS and BLM participation in managing the risks within the least populated areas will generally be high. Considering all the land in the Interior Columbia River Basin, approximately 58% was classified as low risk, 20% as moderate risk and 22% as high and very high risk. The ICRB Science Assessment classified the areas bordering the Elk City township and the lower South Fork Canyon below the mouth of Mill Creek as moderate risk. There are also other private inholdings outside the South Fork Canyon in Red River, Crooked River and Newsome Creek that are likely moderate risk areas (Map 47). Locations of private lands within the South Fork assessment area are shown in Map 2).

The primary people-wildlands interface concern in the subbasin is wildfire. This is especially true of areas where private lands lie uphill from where a potential wildfire might start. Things can be done to lessen the risks. Expanding public education concerning the risks is important. Cutting unwanted brush and limbs around structures and assuring building materials are not highly flammable are important considerations. The Forest Service can also take steps to lessen risks. Increasing public awareness of high risk areas is a first step. Once such areas are known, the agency can take appropriate measures in their initial attack on wildfires. High risk areas should also be considered when designing vegetation treatments especially in those areas in close proximity to private lands.

Land Uses

Timber Harvest

Some timber harvest was associated with early mining activity between 1860 and 1910, and with homesteading from 1910-1920. In 1863, a sawmill was built in the vicinity of Elk City. By the turn of the century, as many as seven sawmills were producing lumber in the Elk City mining district. No data is available on the amount of harvest that occurred prior to 1920.

Commercial timber harvest began in the 1940s. During the 1940s, and through the 1950s, the rate of timber harvest was relatively low. The harvest that did occur was mostly selective harvesting, which removed only high value species, such as ponderosa pine.

The sawlog timber volumes sold in the South Fork basin since 1971 are shown in Table 3.11. The sold volume level peaked in 1972 at 83.4 MMBF. The lowest level was in 1992 with a figure of 0.3 MMBF sold that year.

Table 3.11 - Sawlog Volume Sold from South Fork Basin

5 Year Periods	Total MMBF	Average MMBF/Year
1971-1975	289.3	57.9
1976-1980	284.3	56.9
1981-1985	224.4	44.9
1986-1990	221.0	44.2
1991-1995	91.8	18.4

In 1958, the Shearer Lumber Products sawmill near Elk City opened. This mill, as well as other mills which opened about the same time, created a large demand for timber. As a result, the rate of harvest increased during the 1960s and 1970s. Clearcutting was the dominant silvicultural system used. During the 1980s and so far in the 1990s, the rate of timber harvest has been decreasing. There has also been a trend since the mid-1980s of reducing the amount of clearcutting.

Logging systems used to skid logs to landings have also changed. From the 1940s through the 1960s, all skidding was ground skidding. Ground skidding on slopes of 45-50 percent occurred and was not considered a problem. Ground skidding on these steep slopes required excavated skid trails. In general, skid trail density was higher compared with today's levels.

In 1970, the first timber sale in the subbasin requiring cable yarding (hi-lead and skyline logging systems) was sold. Since then, use of cable yarding on steep ground has become common practice. This has greatly reduced the need for excavated skid trails. It has also become common practice to obliterate excavated skid trails when they are no longer needed.

Site preparation and fuels abatement practices have also changed. In the 1960s through the mid-1980s, reducing fuel hazards and preparing sites for planting often resulted in too much disturbance and not leaving enough debris for nutrient recycling. Dozer piling and broadcast burning, often intense, were the most common practices used to treat logging slash. These practices heavily impacted the soil and other site conditions. Since 1988, dozer piling has largely been replaced by grapple piling, broadcast burning, and yarding unmerchantable tree tops and limbs to landings.

Since Forest Practices Act rules and regulations were adopted in 1974, the State of Idaho has exercised oversight of harvest on private lands. Inspections are made by the State to ensure compliance with these rules and regulations. Records indicate approximately 55 percent of the harvests are inspected and those harvests on high hazard sites (fish bearing streams, unstable/erosive soils or steep slopes) are inspected more frequently. If a landowner is not in compliance with Idaho Forest Practices Act, steps are taken to mitigate impacts at the landowner's expense. From 1991 to 1993, the number of harvest activities on private lands in the subbasin has increased from 107 to 234. The size of individual harvests is also increasing. The increased timber harvest activity on private land is mostly related to continuing demands for products and diminishing available supplies from federal lands.

Mining

The geology of the area is rich in gold and other valuable metals. This led to the first occupation of the area by miners and settlers. Map 22 shows the general geology of the area, as well as the current and historic mining sites.

The first major gold discovery in the assessment area was in June, 1861 near Elk City. A placer mining boom followed, concentrated in the upper part of the basin. The earliest mining used hand tools and methods such as sluices and rocker boxes. By the mid-1860s, extensive ditch construction allowed the first hydraulic mining to occur. In 1894, two hydraulic operations in the Elk City area employed 20 men each. The hydraulic mining resulted in thousands of cubic yards of sediment being washed into stream channels and rivers, severely impacting the subbasin's aquatic resources.

The first dredge operated in the Elk City area in 1891. By the early 1900s, bucketline dredges were being operated on American River, Red River and Crooked River, with dragline dredges operating in the smaller streams.

The first lode (hard rock) deposits were prospected in 1870, but it wasn't until 1902 (when the American Eagle mill was built) that full scale lode mining took off. In upland areas, lode mines averaged a couple acres or less in size and most work was completed with hand tools. This resulted in minimal watershed impacts. However, the mills that processed the gold ore were often located near streams, both for water supply and potential power supply. The mills of the time often used mercury and cyanide. It is likely that cyanide and mercury contaminated tailings were discharged into the streams.

During the depression era of the 1930s, the federal government encouraged people to try mining as an alternative to public relief. In addition, the highway from Grangeville to Elk City along the South Fork River was nearly completed. As a result, the 1930s saw a big revival of placer mining and some lode mining. In the assessment area, two bucketline dredges and several draglines were used. Of all the historic human activities that have occurred in the assessment area, large scale dredging has had the most direct negative impact on streams.

Most of the heavy dredging occurred in the tributaries (Newsome Creek, American River, Red River, and Crooked River) and in the upper section of the South Fork from the mouth of Newsome Creek to its upper reaches. Entire valley-bottom riparian areas were adversely impacted and all potential and existing woody debris was removed. Unfortunately, most of these impacts occurred in the lower gradient sections, which provide the most productive fish habitat in terms of spawning and rearing. The end result of the dredging was to convert extremely complex aquatic ecosystems into simplified, unproductive, confined stream channels. In all, by 1960, more than 24 million cubic yards of material (along about 30 miles of stream) had been dredged in the subbasin (Map 15).

Hydraulic mining was also revived in the 1930s. Approximately 426 acres (including private and BLM land) have been hydraulically mined since the 1860s. Hydraulic mining washed hillsides into streams, contributing large amounts of sediment to the South Fork Subbasin. Such large amounts of sediment caused changes to stream morphology, because the volume was too great to be washed downstream. Large amounts of sediment were deposited in the slower reaches, creating new sand bars and reducing stream gradient in some places. A large portion of this sediment is probably still in the basin today. The pits left by hydraulic mining are called "glory holes". These glory holes are continually eroding and contributing sediment to the system due to their large, unvegetated, unstable banks. Fortunately, large reclamation projects have greatly reduced the amount of sediment entering the adjacent streams.

In 1941, all gold mining was prohibited due to the United States entry into World War II. After the prohibition was lifted, very few mines were reopened, although a bucketline dredge did operate in the 1950s in the subbasin. More recently, activity has consisted mostly of small scale suction dredging and placer and lode operations. Professional opinion on suction dredging effects varies, but compared with historic mining, impacts are much lower today. Suction dredging (with nozzle sizes up to 8 inches in diameter) does contribute, however, to the already high sediment load in the South Fork.

Since 1974, Forest Service mining regulations have led to a reduction in impacts related to mining. One provision of these regulations was that a bond be furnished by the operator to ensure that reclamation would occur. Environmental laws passed in the 1970s and 1980s, and approval of the Forest Plan in 1987, have also led to reduced impacts caused by mining.

Aggregate sources (rock pits) have been developed in the subbasin over the years. There are about 70 rock pits within the drainage area that have had activity in them in the last 30 years. Most are bank excavation above an entry road. Others are existing dredge tailings. These sites are usually 1-2 acres of cleared area. Approximately 35 sites have been rejected for some reason, such as poor quality rock or difficult access. About 15 sites have, for all practical purposes, been depleted of rock. There are ten inactive aggregate sources in the subbasin that could be reopened, if needed, and ten sources are considered active.

Grazing

Forage availability in forested habitats of the subbasin was much greater prior to the era of fire suppression. A report prepared by Community Land Use Planning Committee in July 1940 titled, Progress Report on an Agriculture Program for Idaho County, states, "...grazing areas are growing up to brush and Jack Pine thickets, it is impossible to get into areas which were formerly grazed. It is the belief of the committee that fire protection has been chiefly responsible for this condition."

Historically, both Native Americans and Euroamerican settlers recognized that forage was abundantly available to graze domestic livestock in some of these forested habitats. In fact it was common practice to move large bands of horses or sheep into areas that had previously burned, recognizing that there would be a flush of new forage that would emerge from the fire event.

Over time the opportunistic grazing that occurred because of natural wildfire has slowly been replaced by grazing which finds its opportunities from openings that occur through timber harvest. It is estimated that much more grazing by domestic livestock was occurring during the turn of the century than occurs now.

The Nez Perce Tribe pastured large bands of horses throughout the area. It is also known that the Nez Perce Indians practiced some of their own prescribed fire management. It is speculated that part of their program was to create forage for their large horse bands. It is believed use was concentrated in areas where abundant forage was located and where horses could easily be gathered. Mountain grazing was presumably light considering this assumption.

In the mid 1860s, with the gold rush and the movement of people to the area, domestic sheep and cattle also arrived. As additional people moved to the remote mining boom towns, stock raising increased. Opportunistic stock growers set up livestock operations in suitable areas around major trail heads leading to the large mining camps.

The NezPerce National Forest was established by executive order in 1908 and grazing laws were enacted. By this time the livestock industry was thriving on rangeland of the area. Homesteads on the prairie were common, with most homesteaders being combination farmers and ranchers. Stites, a community along the South Fork Clearwater, was the major livestock shipping area for the entire county.

There are currently twelve active allotments in the subbasin. An allotment is a designated area of land available for livestock grazing upon which a specified number and kind of livestock may be grazed under a range allotment management plan. Cattle are the only livestock permitted to graze in the subbasin. Allotments total approximately 222,100 acres of the 515,000 acres within the Nez Perce National Forest portion of the subbasin. Approximately 105,450 of those acres have forage and are suitable for grazing.

The degree of impact to the subbasin from domestic livestock grazing has fluctuated over the years, depending upon the number and type of animals grazed, duration of grazing and allotment management. Recent monitoring has indicated that Forest Service allotments are not now a major contributor to degraded fish habitat or water quality. However, about a third of the allotments have localized areas of overuse. This overuse has resulted in damage to stream banks and reduced riparian vegetation (Map 15).

Private, BLM, State and Tribal lands have been grazed by domestic livestock since the mid 1800s. The extent, location of and effects of that early grazing activity are unknown. The earliest surveys documented were done in 1962 in Cottonwood Creek. These surveys indicate that riparian zones were in poor condition and water temperatures in the summer were high, limiting fish survival. It is assumed that the conditions reported were the result of both agricultural use and overgrazing by livestock. Later studies, 1974, 1980, 1982, 1987 and 1992 all indicate a lack of riparian vegetation in agricultural and pasture areas, an overall lack of vegetative diversity and severe channelization of the stream. To what degree impacts reported are directly attributable to livestock grazing is unknown

Grazing Capability - Capable grazing lands are areas within the subbasin with physical and biological characteristics conducive to livestock grazing. Capability is related to the potential of an area to produce adequate forage and that exhibits physical features that will allow livestock grazing. Examples of areas not capable include excessively steep slopes, rock outcrops, habitats with inherently low potential for forage production, and fragile, highly erodible soils.

Potential forage production by habitat type groups, slope classes, and landtypes were used to delineate areas that have the potential to produce forage and are accessible to livestock. These classes are shown in Map 23. For forest habitat types, this map displays potential production with forest canopy removed. Forage would be only transitory until forest canopy closure was reestablished, about 20 to 40 years after disturbance. Forage levels after canopy closure are lower.

Grazing Suitability - Suitability means that forage is not only available and accessible, but that grazing is compatible with other resource uses including maintenance of native plant and animal community and species diversity and stability, soil and water resource protection, protection of aquatic habitats, or recreational or other human uses or values. Map 24 identifies where some of these conflicts might occur and where special management of grazing practices is likely to be warranted. Areas suitable for grazing are capable and do not include disturbed grasslands or fragile soils on slopes more than 60%, rare plant communities vulnerable to trampling, developed recreation sites, or wetlands or streamside meadows subject to trampling or streambank damage.

Outfitting-Guiding

Licensed outfitter-guides use roughly half of the assessment area for permitted activities. The area is also open to the general public.

Licensed outfitting and guiding for big game hunts has occurred in the subbasin for many years. There are currently seven different outfitters who utilize at least a portion of the assessment area. All of the current businesses were established prior to 1985 and all have undergone a change in ownership since then.

Outfitting and guiding in the subbasin focuses mostly on big game hunting featuring elk, deer, black bear and cougar. Within the last year, two outfitters have diversified their businesses by including fishing and pack trips. There are currently no outfitter-guide permits for water related activity, such as rafting or kayaking, in the subbasin.

It is anticipated that outfitting and guiding services will be needed in the subbasin over at least the next decade. Outfitter services will still be requested by the public, although the type of services may change to less consumptive activities. Due to the innovative development of river equipment, better rescue techniques, and a rising demand for shorter whitewater trips on technical waters, we may also see this type of outfitted activity develop on the South Fork Clearwater River.

Recreation

Recreation in the South Fork has been an important activity. The early trails and wagon roads throughout the South Fork became some of the important access routes for people in nearby prairie and river communities to hunt, fish, and camp on the Nez Perce National Forest. The South Fork Clearwater River and Red River now have most of the developed campgrounds on the Forest (See Map 25). Most of the recreation use, however, is still dispersed activities such as big game hunting, picnicking, camping, berry picking, fishing, wood cutting, and driving for pleasure.

The Forest Plan projected large, almost equal increases in recreation demand for all recreation opportunity spectrum (ROS) classes in the next fifty years. ROS classes have been assessed for the area (See Map 26) and described for each ERU in project file resource reports. Seventy percent of the subbasin (not including the Camas Prairie) is in a Roaded Natural Setting with area closures and road/trail restrictions. Only 19% is Semiprimitive Motorized and Nonmotorized and 11% is Primitive.

ERUs with significant amounts of Semiprimitive settings are Silver Creek, Red River, Crooked River, and Johns Creek. Primitive settings occur in the Gospel Hump Wilderness portions of Wing Creek, Ten Mile and Johns Creeks. It should be noted that in most ERUs, motorized use by ORVs is increasing at a high rate and this use is not being limited to roads and trails. ORV use in areas where access can be obtained (open ridges, firelines and open country) is increasing. Meadow Creek, Cougar-Peasley and American River ERUs are the only areas that have designated ORV trails (less than 5% by mileage).
Recreation settings, principle activities, scenic concerns, and access implications are summarized for each of the ecological reporting units shown below.

South Fork Canyon ERU - The South Fork River, State Highways 13 and 14, Castle Creek and other South Fork Campgrounds, river beaches, Huddleson Bluff, the Cove, and Earthquake Basin are places people associate with this ERU. Scenic integrity is important along the river, especially view points from recreation sites and State Highways 13 and 14. From the forest boundary to Elk City, the canyon is a sometimes spectacular, almost entirely unmodified, forested landscape. The South Fork Clearwater River was listed as an eligible river segment (recreation classification) for inclusion in the Wild and Scenic Rivers System, in the Nez Perce Forest Plan, Appendix P. A detailed suitability will be conduscted at a leter date. Only the existence of the state highway detracts from a primitive setting. Trail uses, wildlife viewing, and whitewater boating are the fastest growing activities within the corridor.

Meadow Creek ERU - McComas Meadows, Camp 58, Meadow Creek ORV Trail, Corral Hill Lookout, Ten Mile Flat, and the Elk City Wagon Road are places people associate with this ERU. Maintaining scenic integrity is important in the vicinity of McComas Meadows and along the Elk City Wagon Road. Some of the earliest logging on the forest occurred in this area, including the construction of a logging camp (Potlach's Camp 58) at the lower end of McComas Meadows. In the 1960s, the privately owned McComas Meadows was a popular fishing and camping site. Since then, cattle grazing has degraded the stream channel and fishing use has declined. The area is used by hunters and campers from early archery through the late whitetail deer season. In 1992, the Forest Service acquired the McComas Meadows, with the expectation of restoring aquatic and vegetation conditions. The Elk City Wagon Road is a popular attraction where forest visitors experience the past by travelling a route used by miners and homesteaders in the late 1800's.

Cougar-Peasley Creek ERU - Cougar Mountain rock pit, Cougar ORV trail, and Big Burn Point are places people associate with this ERU. Recreation activities include big game hunting, cougar hunting and ORV trail riding. Old brushy burns, pine and fir plantations, and scattered old ponderosa pine with stringers of old grand fir characterize this area. Recreation use is light except during the fall and winter hunting seasons. The Cougar ORV trail passes through mature pine stands and is connected to the Big Burn Point and the McComas ORV trail systems.

Silver Creek ERU - Silver Ridge, Reed Mountain, Pilot Rock/Pilot Knob and Elk City Wagon Road are places people associate with this ERU. Scenic integrity is important from view points along the Elk City Wagon Road and at Pilot Rock. Recreation activities in this ERU include big game hunting, driving the Elk City Wagon Road, snowmobiling and trail uses. The Pilot Rock/Pilot Knob area is known for it's religious and cultural significance to the Nez Perce Tribe and for being mostly roadless.

Newsome-Leggett Creek ERU - Newsome Townsite, the Elk City Wagon Road, and dredge mines are places people associate with this ERU. Scenic integrity is important from view points along the Elk City Wagon Road. Recreation activities in this ERU include dispersed camping, berry picking, big game hunting, recreational suction dredging/gold panning and snowmobiling, A portion of the Reed Mountain trail from Leggett Creek is open for highway vehicles to provide a backcountry driving experience and hunter access. The Elk City Wagon Road and Newsome Townsite are historically significant. The Wagon Road is also a popular snowmobile route from Clearwater to Elk City. Motorized use (specifically ATVs) is rapidly increasing in popularity on the trail system in this ERU. There are many opportunities for creating ATV routes using the existing road system that should be explored. The existing trail systems are showing tread widening from uncontrolled ATV use (especially the Nugget Point and Upper Newsome trails).

American River ERU - Elk City, ranches, homesteads, and pastures are places people associate with this ERU. Scenic integrity from view points along the Elk City Wagon Road, Kirk's Fork trail, Flat Iron trail, Anderson Butte trail and connectors, and Limber Luke trailhead is important. Recreation activities include big game hunting, driving for pleasure, and various motorized and non-motorized trail uses. The Elk City township, a combination of BLM, private and some state lands is a rural, pastoral setting including a small town, within a remote, forested landscape. Shearer's Mill (Bennett Lumber Company) is located a few miles from town, near the junction of American River and the South Fork. Elk City has become a destination place on driving tours primarily from the Selway basin and along the Elk City Wagon Road. Anderson Butte Lookout is a popular destination for trail riders (motorcyclists and, increasingly, mountain bikers), horse users and hikers via the Anderson Butte National Recreation Trail. Motorized and non-motorized trail uses by local residents and out-of-area recreational users is increasing. Motorized use (specifically ATVs) is rapidly increasing in popularity on the trail system in this ERU. Non-motorized uses remain relatively consistent, with light to moderate numbers of local and out-of-area recreational users during the summer and fall seasons.

Red River ERU - Red River Meadows, Red River Ranger Station, Dixie, Red River Hot Springs, the Montana Road, and the Southern Nez Perce Trail are a few of the places people associate with this ERU. Scenic integrity is important from view points along the Red River road, campgrounds, and trailheads. Recreation activities include developed and dispersed camping, big game hunting, trail uses, wildlife viewing, fishing, gold panning, snowmobiling, and soaking at the hot springs resort. The Red River meadow complexes dominate the sense of place of this large, extensively roaded and logged area. This ERU is the most popular recreation area in the South Fork. Camping and big game hunting are popular activities, but trail uses (ATV and motorcycles), wildlife viewing (elk, osprey, salmon) and snowmobiling are increasing. The popularity of ATV trail riding on ERU roads and trails is growing dramatically. Use of this type of vehicle is evident in trail treads widening from 24 to 48 inches on some heavily used trails where use is unrestricted.

Crooked River ERU - Crooked River dredge mining, the Orogrande Townsite, Gospel Hump, and Penman Hill access are a few of the places people associate with this ERU. Recreation activities include dispersed camping, fishing, ORV use, and driving for pleasure. The highly altered stream channel from dredge mining dominates the view for Crooked River travellers. The road is a popular travelway for motorists on the "Gold Rush Loop Auto Tour" from Crooked River to Elk City via Penman Hill and Dixie. It is also the main motorized access to the east side of the Gospel Hump Wilderness. The road accommodates heavy ATV and snowmobile use. One of the fastest growing activities in this ERU is snowmobile and ATV use in the corridor. The Jerry Walker cabin, a forest service facility, is available to the public for rent. Private lands along Crooked River are being developed for vacation homesites.

Tenmile Creek ERU - Sourdough-Santiam Road and the old Golden Townsite/cemetery are a few of the places people associate with this ERU. Scenic integrity is important from the Sourdough Road and Wilderness trails. Recreation activities include big game hunting, trailhead access to Gospel Hump Wilderness, horse packing, and hiking. Use by recreationists is light but increasing. The Tenmile Trailhead provides important trail access to the upper end of the Tenmile drainage and the Gospel Hump Wilderness.

The Wing-Twentymile Creek ERU - Sourdough-Santiam Road, the historic Sourdough Lookout, Twenty Mile Meadows, and Gospel Hump Wilderness are a few of the places people associate with this ERU. Scenic integrity is important from view points along trail systems. Recreation activities include big game hunting, camping, driving for pleasure, hiking, and horseback riding. Recreation use is light but increasing. Trailheads provide important trail access to Upper Wing Creek, Twenty Mile Meadows, and to Twenty Mile Lake in the Gospel Hump Wilderness.

Johns Creek ERU - The Gospel Hump Wilderness, Gospel Peaks, Square Mountain, Gilmore Ranch, and Hungry Ridge are a few of the places people associate with this ERU. Scenic integrity is important from view points along trail systems, both inside and outside of the Wilderness. Recreation activities include hiking, horseback riding, big game hunting, and fishing in Johns Creek. Johns Creek has long been a popular hiking and horseback area close to surrounding communities. The Gilmore Ranch is a private inholding with a large meadow surrounded by big pines and a view into the Gospel Peaks. A trail has been constructed around the ranch on the breaks of Johns Creek. Johns Creek was listed as an eligible river segment (wild classification) for inclusion in the Wild and Scenic Rivers System in the Nez Perce Forest Plan, Appendix P. Hungry Ridge Road 309, beginning at the mouth of Mill Creek on the

South Fork, accesses this ERU on the lower west side of Johns Creek. The Square Mountain Road provides a popular yearlong corridor to the Gospel Mountains and to Square Mountain in the very heart of the Gospel Hump Wilderness.

Mill Creek ERU - Merton Meadows, Sawyer Ridge and Adams Camp are a few of the places people associate with this ERU. Scenic integrity is important from view points along trail systems. Recreation activities include big game hunting, fishing, wood cutting, driving for pleasure, ATV use and snowmobiling. Big game hunting from dispersed camps along the Grangeville Salmon and Hungry Ridge roads is popular. Adams Camp is an historically significant administrative site and is used as a destination and overnight stop for snowmobilers and snow trail groomers.

Miscellaneous Forest Products

The special forest products industry is separated into five segments: (1) wild edible mushrooms, (2) floral greens, (3) Christmas ornamentals, (4) other edible and medicinal plants, and (5) Pacific yew. Recreational gathering is not regulated nor users counted. Commercial use is allowed by permit. Demand for other forest products in the assessment area is relatively low when compared with demands in Washington and Oregon or even North Idaho, or when compared with the demand for sawtimber. In general, requests for all categories of special forest products are expected to remain low.

Wild Edible Mushrooms - Wild mushroom harvesting in Idaho, and particularly the Nez Perce National Forest, is not as important as in Oregon, Washington, or northern Idaho because of the drier central Idaho climate. There has been little demand for gathering permits in the assessment area. Interest in gathering permits usually peaks a year after a large wildfire. Mushrooms from Idaho generally bring a higher price than the same species in adjacent states because of Idaho's later season. About 65% of the mushrooms gathered in Idaho are processed in Washington or Oregon.

Floral Greens - Beargrass is probably the most important special forest product harvested in the subbasin with most of the gathering taking place on the Elk City District. Determining the quantity of beargrass removed is difficult since the permits are issued for "days " allowed for gathering. Thirty-five individual permits were issued in fiscal year 1996 for a total of 255 days. All the permittees have been from the Tacoma, WA area and the product has been processed in that area. Demand for beargrass will probably show a slight but steady increase in the future. A small amount of Pachistima is used as a substitute for evergreen huckleberry in floral arrangements. Pachistima is present in the South Fork area, but the amount and demand will not justify commercial gathering of this species. Alder and Rocky Mountain Maple are common in some habitats within the subbasin. Individual plants provide uniquely bent or twisted shapes. There is some interest for using the material for rustic furniture construction. Current demand is low, but may increase if demand for the furniture increases.

Christmas Trees and Ornamentals - Evergreen boughs and cones are used during the Christmas season for wreaths and swags. There has been no demand in this area for commercial quantities of this material although several people do collect and produce a few ornaments as a hobby. Many families look forward to the annual outing to cut the family Christmas tree. This ritual can provide the opportunity for many hours of hiking through knee deep snow to find the perfect tree. About 350 Christmas tree permits are sold annually on the Nez Perce National Forest. It is impossible to determine what portion of these are cut in the subbasin. Requests for Christmas trees have usually been limited to personal use. The demand for permits is low because of the lack of large population centers. The number of permits sold has been remaining fairly constant. Commercial Christmas tree cutters occasionally purchase cutting permits on the Forest. Few return, however, because of difficult terrain, poor access, coloration of the trees, or species available.

Other Edible and Medicinal Plants - Huckleberries, blackberries and elderberries are probably the most important edibles in the South Fork area. Most are gathered by recreational collectors. A very small quantity is gathered by commercial collectors. Forests to the north provide larger berries and easier opportunities for commercial gathers of huckleberries than the South Fork of the Clearwater. Medicinal uses, including quinine conks, cascara bark, roots and herbs have not been adequately documented. Use is thought to be relatively minor and will probably not increase.

Posts and Poles - The demand for post and pole material varies considerably from year to year. There is some demand for incidental amounts by local ranchers. Commercial operations are affected by the supply of raw material and availability of a local facility to process the product. Various post mills have operated in the area during the past decade. Some of these mills have operated intermittently because of a lack of a continuous supply of raw material.

The subbasin has stands of post and pole size lodgepole pine suitable for commercial harvest. However, the profit margin for these products is low. Most of the posts and poles currently being removed are derived from top wood or sub-merchantable material skidded along with sawlogs. Since there is an investment in this decked material, some operators are willing to remove it to help recover their investment. A few sales or permits are sold each year to commercial post cutters. Because of the small profit margin, most post cutters cannot afford to maintain skidding equipment except for an occasional small skidder or crawler tractor. The most desirable post sales are in areas that can be worked by this equipment or even by hand. The ideal post stand, from a operators viewpoint, is on flat terrain where a 1 or 1-1/2 ton truck can be driven through for loading the posts. For those conditions, an operator only needs a moderate sized chainsaw and a suitable truck. Approximately 14,000 cubic feet of posts are cut annually on the Forest. Approximately 90% of this post volume comes from the South Fork Subbasin.

Fuel Wood - Firewood cutting is important to many people in the surrounding areas for heating homes and for supplementing their income. It is perhaps the most widely used miscellaneous forest product removed from the Forest. The amount saved by burning wood, as opposed to other sources of fuel, may make fuel wood the most important miscellaneous forest product from an economic standpoint. There is concern about the future availability of fuelwood, even though there are more slash piles or suitable standing dead trees than needed to meet fuelwood demands. Standard equipment for a firewood gathering is normally a chainsaw and a pickup truck. The lack of skidding equipment means that desirable firewood must be within falling distance of an open road so that it can be manually loaded into a pickup. The Forest currently issues approximately 1,000 personal use wood permits for 2,500 - 3,000 cords and it is estimated that 70% of this wood is cut in the South Fork Subbasin. Road closures for wildlife protection limit firewood cutting opportunities. However, the Forest periodically opens some of the closed areas for short periods for firewood cutting.

P**acific yew -** There is an abundance of Pacific yew in the subbasin. Collecting yew bark for the production of taxol used in the treatment of cancer was an important industry in the subbasin in 1991-1992. Harvesting and processing yew bark provided seasonal employment for 30 or more people. For various reasons, demand for yew bark from federal lands has decreased. Demand is expected to stay low. Wood from Pacific yew has been used in the construction of handmade bows and other speciality items. Demand for this product will probably remain low.

Agricultural Uses on Private Land

Agricultural uses on private lands began in the mid 1800s as settlers began moving into the area and establishing homesteads and ranches. See earlier discussion under "Grazing." Tilling soil and planting crops was probably insignificant as far as total acres in those early years of homesteading. With the development of mechanized equipment, however, larger and larger areas were put into crop production. Many of the riparian areas within these farmlands have been tilled, leaving little vegetation to act as a screen to trap sediment during periods of runoff. Idaho Soil and Water Conservation District representatives estimate approximately 60 percent of all private agricultural land has had riparian vegetation removed. During spring runoff, flooding of cropland, pasture and hayland adjacent to streams occurs. Severe streambank erosion has also occurred in some areas resulting from the high velocity flows associated with seasonal flooding events.

Much of the cropland is left in a tilled condition going into the winter. Soil erosion is caused primarily from warm Chinook winds and/or warm winter rains on snow or frozen soil, resulting in rapid runoff during the period of November through March. This occurs when the soil is partially frozen and surface water infiltration is greatly reduced. Runoff erodes the soil down to the frozen layer, carrying sediment onto lower lands and into stream systems. Localized, high intensity rainstorms may occur at any time during the year causing runoff and serious soil erosion.

The use of agricultural chemicals on private lands has been widespread in the past and continues today. In recent years, approximately 2/3 of the cropland area receives at least one application of chemicals a year. Application is either by plane or ground equipment.

Transportation Systems

Roads

Currently, the total mileage of roads in the subbasin (including both public and private lands) is approximately 2100 miles. The rate of road construction has varied by time period during the last century. The first roads, approximately 30 miles, had already been constructed by the 1890s. The rate of road construction then increased until the 1960s, when a peak of approximately 600 miles were built. During the 1970s and 1980s approximately 400 miles were constructed each decade. Since 1990, about 100 miles have been built. The expected trend in the future is for a decreased rate of construction and increased rate of obliteration, resulting in a possible overall net reduction in existing miles.

The existing condition of these roads varies. Some are completely grown over with grass and vegetation, others are narrow, single lane, dirt or gravel surfaced; still others are double lane paved highways.

Reasons for constructing roads have changed through the years. Prior to the 1960s most of the roads were constructed to access mining sites, homesteads, administrative sites (fire lookouts), and for general settlement of the area. Since 1960, the majority of road construction has been associated with timber harvest.

Construction techniques have changed as well, from hand construction and horse drawn graders in the early years, to bull dozers in the 1950s, 1960s and 1970s, to hydraulic excavators during the latter part of the 1980s and into the 1990s. The hydraulic excavators provide the advantage of being able to better handle and place excavated material and are better at handling slash and right of way logs.

Since the mid 1980s, sediment mitigation has been of paramount concern related to road construction. A number of mitigation techniques have been developed. Probably the most important is the avoidance of road construction in or near riparian areas and landslide prone areas where possible. Additional measures and techniques regularly used include: slash-filter windrows, grass seeding and vegetative planting all disturbed ground, installation of drop inlet culverts, controlling construction slopes, dewatering culvert locations prior to installation, and using rock to surface roads, armor ditchlines, drain and support the subgrade, and to buttress backslopes. A number of older roads have been reconstructed, mostly in the past decade, resulting in improved sediment mitigation. Currently, all main timber haul roads have either an aggregate or paved surface.

Road development on non-federal lands can be characterized as urbanized (city streets, driveways) around population centers, State Highways 13, 14 and 95, and rural (County or road district maintenance) farm-to-market roads throughout the remainder of the area.

Approximately 80 miles of road located within the Forest boundary are maintained by other agencies. These roads access the towns of Elk City and Dixie, or popular recreation sites like the Red River Hot Springs. This figure does not include sections of road within the Elk City township because they do not lie within the National Forest. These roads are maintained either by Idaho County or the State of Idaho Department of Transportation.

The State of Idaho maintains State Highway 14, a paved road, which parallels the South Fork Clearwater River for its entire length. Approximately 40 miles of road run along the river from the Forest boundary at the bottom of Mt. Idaho grade to the Elk City township line. Idaho County has jurisdiction over about 50 miles of road within the subbasin. These roads include the Crooked River Road 233 (12.2 miles with aggregate surfacing), the Red River Road 222 (25.2 miles of paved surface in the South Fork drainage), and the Red River Hot Springs Road 234 which has native surfacing over most of its length (10.2 miles).

The ICRB Science Assessment correlated increasing road density with declining aquatic habitat conditions and aquatic integrity. It also recognized that strong populations of fish are present in some roaded watersheds and that the details of the interactions between aquatic environments and road development are not yet fully understood.

Roads are necessary to support the current use of public lands. Roads provide access for a variety of uses, including vegetation management, fire suppression, recreation, mining, and access to private land inholdings. Transportation planning over the last decade indicates that 3-5 miles of road per square mile are normally required to provide full access for most logging systems. Road densities of this magnitude are classed as either high or very high by the ICRB Science Assessment.

Total road density (includes private, county and Forest system and non-system roads) in the South Fork Subbasin above the mouth of Lightning Creek is approximately 2.5 miles per square mile, but road development has not been uniformly distributed. Road densities in key tributary watersheds vary from a low of 0.4 miles to a high of 4.4 miles per square mile (See Maps 14 and 27).

The ICRB Science Assessment recommends a reduction or avoidance of undesirable road related effects while providing for some level of access for recreational users, private lands, and other forest users. Reducing effects can be accomplished by a number of means, including modifying construction and maintenance practices, applying access restrictions, relocating existing roads, and obliterating roads. Reviewing and revising road management objectives will be a critical component of this effort.

Trails

Trails were used in the subbasin by the Nez Perce people prior to Euroamerican settlement in the west. Several main routes were used by the Nez Perce Tribe to travel to lands in the Bitterroot Valley in Montana (Map 20). Archaeological evidence indicates that the Nez Perce people used land throughout the subbasin and consequently some level of trail system must have existed.

Trails were later developed and used by early explorers, mineral prospectors, grazing interests, and the National Forest for the use and administration of the lands. Many of these trails have been abandoned or replaced with roads.

Currently, there are approximately 397 miles of trail inventoried within the subbasin. Approximately 51 miles are within riparian areas. Trails mostly receive foot and packstock use; however, some motorized use trails occur near Cougar Mountain and Anderson Butte. There is an increasing demand from user groups for motorized trail opportunities. Motorized uses are increasing in all areas, most notably in areas adjacent to popular, dispersed and developed recreation sites. In some areas, conflicts are increasing between motorcycles and non-motorized users. Most of the existing trail system was designed for pack and saddle stock or 2-wheeled motorized vehicles. The increased use of 4-wheelers is widening some trails, which at times, exacerbates the resource damage caused.

Existing Travel Plan

The existing travel plan for the subbasin is a compilation of decisions reflecting a diversity of public user expectations, resource protection needs and safety issues. The majority of roads and trails in the subbasin are under the jurisdiction of the Forest Service. Typically, travel management decisions (road and trail restrictions/closures) are made during project analyses using guidance from the Forest Plan. In the Plan, 13 access prescriptions were identified, ranging from open to all State legal motorized vehicles to closed to all use, including foot travel. The majority of access prescriptions focus on limitations to season of use or vehicle type. These access prescriptions may apply to both roads and trails. Table 3.12 displays total road miles and the percent of road miles having restrictions by ERU (Map 27). County and State roads are assumed to be open and are included in the totals.

Some general travel management characterizations for the subbasin include:

- ❏ Most current restrictions and closures have been adopted to provide for elk habitat. User safety, conflicts with other uses, and other resource protection have not driven most travel management decisions.
- ❏ Many trails in the upper units of the subbasin are currently open to ATV use. Few of those routes were designed to accommodate these types of vehicles.

- ❏ Yearlong closures and restrictions of roads and trails are more prevalent in the eastern (upper) portion of the subbasin. Seasonal restrictions (particularly winter) are more common in the western part.
- ❏ Area restrictions are more extensive in the western portion of the subbasin.
- ❏ Most areas are open to snowmobile use. In some areas, roads and trails have been closed when there was a known conflict related to big game winter range values, other vehicle traffic, or other recreation use.
- ❏ Many of the early roads into the subbasin still remain open to public travel. Closures and restrictions have mostly been applied to roads built after 1960.

Table 3.12 - Total Road Miles and Percent with Restrictions

ERU	Total Road Miles	% Road Miles Restricted
South Fork Canyon	487	59
Meadow Creek	164	64
Cougar-Peasley	103	80
Newsome-Leggett Creek	249	75
American River	213	55
Red River	588	82
Crooked River	137	66
Ten Mile Creek	24	44
Wing-Twentymile Creek	27	50
Johns Creek	60	63
Mill Creek	94	78

Scenery Management

Overview

The essence of the Scenery Management System is that the landscapes we see today are the result of both natural and human processes that have occurred over time. Understanding these processes will help us to consider the effects of proposed changes in the landscape and incorporate people's values into decisions more effectively (Introduction to Landscape Aesthetics - A Handbook for Scenery Management). The following paragraphs describe the principles of the system and how they should be incorporated into project planning and implementation.

The Interior Columbia River Basin Ecosystem Management Project recognized five themes which describe, in a very general sense, how people perceive landscape character in the Basin. Landscape character creates a sense of place and describes the image of an area. The two themes which apply to National Forest lands in the assessment area are Naturally Evolving Forests and Natural Appearing Forest Lands. Naturally Appearing Forests, where human intervention is apparent but does not dominate, are found in Meadow Creek, Cougar-Peasley, Red River and Mill Creek. Examples of Naturally Evolving Forests, where human intervention is minimal and natural processes dominate visually, are found in Upper Johns, Upper Silver Creek and Upper Crooked River. Examples of other themes exist in the South Fork, but are mostly associated with private lands.

The vegetation and recreation theme descriptions for each ecological reporting unit will help describe landscape character (See Chapter 4). However, more information and analysis is needed to determine a value unit, or Scenic Class, for integrating scenery into ecosystem management. Constituent information such as identification of important places and concern (sensitivity) levels from certain viewpoints is needed. Some of this information is provided in the recreation theme descriptions for each ecological reporting unit and in the discussion to follow. Information about ecological processes combined with site-specific constituent information and specific distance zone analysis define the Scenic Class value units for alternative development in project planning.

Scenic Attractiveness and Integrity are components of Landscape Character which must be analyzed on a site specific basis. Scenic attractiveness measures the scenic importance of a landscape based on human perceptions of the intrinsic beauty of landforms, water characteristics, and vegetation pattern. Landscape architects have developed criteria to inventory and map scenic attractiveness into three classes: A - Distinctive, B - Typical or Common, and C - Indistinctive. Scenic Attractiveness and Scenic Integrity ratings have been broadly classified by VRU and ERU (See project file).

Scenic Integrity is the deviation from or alteration of the existing landscape character that is valued for its aesthetic appeal. It is usually the degree of direct human caused deviation in the landscape, such as road construction, timber harvesting, or activity debris. In some situations, preferred scenic conditions such as absence of downed woody debris or lack of large areas of burned trees or snags may be counter to the need to provide for wildlife, nutrient recycling, or other ecosystem function. In such cases a high level of scenic integrity must be achieved by establishing an ecological aesthetic which describes how a healthy ecosystem functions and how humans fit into it. This is done through development of landscape character goals. Again, landscape character goals must borrow heavily from ERU vegetation treatment themes.

Scenic attractiveness and sensitivity levels have been described for some areas of the South Fork in recent environmental analyses (See Hungry-Mill and Wing Creek-Twenty Mile FEISs and Silver Cougar Timber Sales EA). For those completed analyses, visual quality objectives, similar to scenic integrity levels, have been adopted in accordance with Forest Plan procedures. For the Newsome-Leggett Creek, American River, Red River, Crooked River, and Ten Mile ERUs, similar analyses should be done for project planning.

Findings

The following summaries characterize some of the special places, scenic attractions, general integrity ratings, and concern levels for ERUs:

South Fork Canyon ERU has distinctive and contrasting vegetation patterns, massive rock outcrops, cliffs, and cascading waterfalls. It has distinctive (Class A) scenic attractiveness of the Columbia Rockies character type. Except for the highway and occasional power lines, scenic integrity is high because the landscape appears unaltered. Fire suppression has altered ecosystem integrity in places, however, and landscape character goals should be developed to reflect needed vegetation treatments. Highways 13 and 14, all recreation sites, and trails in the corridor are concern level 1 viewpoints.

Meadow Creek, Cougar-Peasley Creeks, Newsome-Leggett Creek and American River ERUs are mostly typical of common (Class B) scenic attractiveness of the Columbia Rockies character type. Places such as McComas Meadows, American River Meadows, Anderson Butte, lower Cougar ponderosa pine stands, Newsome Creek and "townsite", and old growth grand fir/Pacific yew communities are distinctive landscape features valued for their scenic attractiveness. Scenic integrity levels are moderate and low in places due to timber harvest, road building, and mining activities. Scenic concern levels are high from McComas Meadows, the Elk City Wagon Road, and on the Anderson Butte National Recreation trails and trailheads.

The Pilot Knob/Pilot Rock portion of the **Silver Creek ERU** has grassy openings with inclusions of quaking aspen and distinctive rock formations which are scenically attractive. Pilot Rock is a level 1 concern viewpoint because of it's importance to the Nez Perce Tribe and other users.

Red River ERU with low relief landforms and continuous forest cover is primarily of Common and Indistinctive visual attractiveness. Some landscape features such as the Red River Meadows, old ponderosa pine stands, historic log buildings, corrals and fences, the Red River Ranger Station, and meandering meadow streams are visually distinctive. Integrity is moderate and low where timber harvest edges contrast with typical vegetation pattern. Level 1 viewpoints are the Red River Road, campgrounds, and trails from the Hot Springs area to the Divide Trail and Blackhawk Mountain.

Crooked River, Ten Mile and Wing-Twenty Mile Creek ERUs are also mostly Common attractiveness in the Columbia Rockies character type. Landforms are gently rolling and vegetation, largely lodgepole and subalpine forest types, is without distinctive color or pattern. Exceptions include Ten Mile and Twenty Mile Creeks and Meadows, whitebark pine and alpine vegetation types, and historic features such as Crooked River dredge mining, Orogrande Townsite, the old Golden Townsite and cemetery, and Sourdough Lookout. The Crooked River and Santiam-Sourdough roads take recreational users to areas of scenic and historic significance. Trails in wilderness are also of high visual concern. Integrity is moderate and high as seen from these travelways, but areas exist where timber harvest units should be modified to restore ecosystem pattern and function.

Portions of **Johns and Mill Creek's** scenic features and concern levels have been documented in the Hungry Mill EIS. Upper Johns has distinctive, Class A, scenic features. The Gospels have extensive stands of alpine trees with a large component of whitebark pine snags. Lower elevation ridges and benches have large, old ponderosa pine. Both of these species types are important visually and should be part of landscape character descriptions for vegetation restoration treatments. Other important visual features are Mill, Merton, and American Creek Meadows. Adams Camp is an important historical feature and visually distinctive. Scenic integrity of these drainages is moderate to very high. Old regeneration harvest units along the Hungry Ridge road are well stocked with sapling, pole and even sawtimber-size trees. Selective harvest has retained much of the old, large ponderosa pine component. Most of the trails, trailheads, the Square Mountain Road, and Johns Creek itself are concern level 1 viewpoints.

Soils

Surface Erosion

Soils are the biologically active zone at the interface of earth and atmosphere. Soils regulate movement and storage of energy, water and nutrients. Soil physical properties, such as bulk density and texture, affect water holding capacity, hydrologic response, and surface stability. Some soil disturbances may require hundreds of years for recovery. Surface soil erosion reduces soil productivity. Eroded soil material may be delivered to streams as sediment, affecting water quality and fish habitat. Table 3.13 displays the extent of harvest and road construction on areas of erodible soils. About 13,000 acres of harvest have occurred on soils with high hazard of surface soil erosion. Observed erosion from harvest is usually slight, except on skid trails. Erosion from harvest units typically declines rapidly with regrowth of vegetation.

Table 3.13 - Activities on Erosion-Prone Soils

ERU	Acres of High Surface Erosion Hazard	Acres of Harvest on High Surface Erosion Hazard	Acres of High Subsurface Erosion Hazard	Miles of Road on High Subsurface Erosion Hazard
American River	4,339	168	44,284	139
Crooked River	7,930	411	16,867	62
Johns Creek	11,124	652	16,541	40
Meadow Creek	5,373	1,630	12,931	85
Mill Creek	8,179	682	13,331	39
Newsome-Leggett Creeks	6,689	676	28,947	136
Peasley-Cougar Creeks	5,527	891	11,011	66
Red River	9,499	929	61,772	355
Silver Creek	4,882	227	9,089	19
South Fork Canyon	46,030	6,453	50,241	304
Tenmile Creek	3,535	139	6,104	9
Wing-Twentymile Creeks	4,102	70	10,036	18
Total =	117,209	12,928	281,154	1,272

Substratum soil erosion can deliver sediment to stream channels. Road construction produces bare soil surfaces tending to erode on the road surface, ditches, cutslopes and fillslopes. Revegetation on long, steep fillslopes and cutslopes often has little success. Erosion continues through the life of the road. Table 3.13 shows that over 1200 miles of road have been built on soil substrata with high erosion hazard.

Compaction

Soil compaction alters runoff patterns and soil water availability. Soil displacement removes the nutrient-rich surface soil from a site, and the underlying mineral soil is often more erodible and lower in nutrients. Areas most prone to compaction and displacement have been timber harvest units logged with tractors and where logging slash has been piled with bulldozers. Table 3.14 shows the acres of tractor harvest and the acres of both tractor harvest and dozer piling. Typically, on areas that have been tractor logged and not dozer piled, about 15-25 percent of the unit has suffered detrimental compaction and displacement (USDA Forest Service, Nez Perce National Forest Monitoring and Evaluation Reports. 1990 and 1991). On units both tractor logged and dozer piled, about 30-40 percent of the unit has suffered detrimental compaction or displacement. Current Forest Plan standards state that no more than 20 percent of an activity area may be detrimentally impacted. Use of dozer piling has declined in recent years, in favor of less impactive burning or excavator piling.

Table 3.14 - Acres of Tractor Logging and Dozer Piling

ERU	Acres Tractor Logged Only	Acres Dozer Piled (usually also tractor logged)
American River	134	1,226
Crooked River	592	1,621
Johns Creek	1,236	1,634
Meadow Creek	588	3,658
Mill Creek	1,420	2,238
Newsome-Leggett Creeks	382	2,793
Peasley-Cougar Creeks	1,313	1,645
Red River	2,764	6,809
Silver Creek	543	209
South Fork Canyon	2,760	4,472
Tenmile Creek	18	18
Wing-Twentymile Creeks	105	0
Total =	11,855	26,323

Productivity

Hot fires can volatilize some soil nutrients and induce water repellency in soils, resulting in increased erosion. Erosion from fires typically is of short duration, until vegetation regrowth occurs. About 15% to 30% of the 2000 acres burned by wildfire in the subbasin since 1980 have burned hot. Most of this was on soils with only moderately erodible surface soils. Broadcast burning on harvest units can also cause nutrient loss, but acres burned severely are not recorded.

Road building essentially removes the road bed and ditch from productive potential, and removes or reduces potential for forage or fiber production, wildlife cover or erosion control on the cutslope and fillslope. One mile of road is estimated to disturb approximately 4 acres. Table 3.15 shows the acres where soil productivity is likely impaired due to roads in the subbasin.

Table 3.15 - Acres of Road Disturbance in the Subbasin

ERU	Total Acres	Acres of Road Disturbance
American River	58,612	852
Crooked River	45,659	547
Johns Creek	72,150	241
Meadow Creek	24,115	657

Mill Creek	23,249	377
Newsome-Leggett Creeks	47,494	997
Peasley-Cougar Creeks	16,843	410
Red River	103,348	2,352
Silver Creek	16,509	109
South Fork Canyon	90,058	1950
Tenmile Creek	34,410	94
Wing-Twentymile Creeks	19,874	45
Total =	552,321	8,631

Large Organic Debris
Large organic debris (down tree limbs, boles and roots) is a critical component of forested soil ecosystems, providing sites for nitrogen transformations, moisture retention, root-microbial interactions (mycorrhizae), wildlife habitats, and sites for seedling establishment. In most fire-prone lands of the subbasin, wildfire is a principal agent in recycling this material, because wood is relatively slow to decompose from microbial activity alone. With fire suppression, periods between fires have been extended, potentially increasing coarse woody debris accumulations and soil productivity. However, the risk of eventual severe fires has also increased, with the potential for loss of this organic material. Such losses could exceed those under the prior presettlement fire regime. Past clearcut harvests may have removed large organic material to a greater degree than presettlement fire. Current harvest practices usually prescribe for some level of large organic debris retention (10-25 tons per acre). In some systems with infrequent fire and moist climates (VRUs 7 and 10) large organic debris was probably more abundant historically than it would be under these prescriptions. How current large organic debris maintenance affects soil productivity over the long term is uncertain.

Aquatic

Watershed, Stream, and Riparian Conditions

Watershed Condition Analysis
In 1992, a coarse filter watershed condition analysis was completed for the Nez Perce National Forest (Gloss and Gerhardt, 1992). This assessment considered watershed sensitivity (erosion potential and channel type), disturbance indicators (road density, timber harvest, fire, grazing, and mining), and the condition of streams relative to Forest Plan objective to derive a low-moderate-high rating for each watershed. Watershed sensitivity, as defined in that analysis, is shown on Map 16. It was derived from a generalized Forestwide soil erosivity map and generalized channel type groups within each watershed. Some small watersheds, such as the face drainages along the South Fork Clearwater were excluded from the analysis. Private lands were considered only if they were internal to predominately National Forest watersheds.

The results of the 1992 analysis are shown on Map 30, expressed as high, moderate, and low integrity. The analysis found that, across the Nez Perce National Forest, 53% of area analyzed rated high integrity, 25% rated moderate, and 22% rated low. Within the South Fork Clearwater Subbasin, 33% rated high integrity, 10% rated moderate, and 53% rated low.

In the 1992 report, the watershed condition results were expressed in terms of high, moderate, and low *concern* for watershed condition. For this assessment, those results have been expressed as high, moderate and low *integrity*. The terms *concern* and *integrity* are essentially opposites as used in this context. The results are the same, but the scales have been reversed.

For the current analysis, watershed condition is discussed in terms of disturbance indicators (road density, % timber harvest, % equivalent clearcut area), estimates of sediment yield (% over natural), and narratively for other impacts. This section provides a watershed-wide overview. More detailed discussions of stream channel and fish habitat conditions are found in following chapters by ERU.

Disturbance indicators are used to index watershed condition based on their effects on runoff or erosional processes. For example, roads affect runoff processes through creation of impervious surfaces and disruption of subsurface flow paths. Roads also expose soil and change slope conditions, which nearly always results in increased surface erosion and can result in accelerated rates of mass erosion, relative to natural conditions. Timber harvest effects are generally not as severe on a per unit area basis as roads, but generally result in increased runoff and erosion. The magnitude of timber harvest effects (aside from roads) are similar to fire, although substantial differences exists between timber harvest and fire effects.

Other human impacts that are significant in the South Fork Clearwater, such as grazing and mining, will be discussed narratively. Quantitative disturbance indicators are not readily available nor commonly used for these activities. The following table summarizes current watershed condition indicators for watersheds within the South Fork Clearwater Subbasin:

Table 3.16 Watershed Condition Indicators

Watershed	Area (acres)	Roads (miles)	Road Density (mi/mi²)	Timber Harvest (acres)	Timber Harvest (%)	ECA (%)	Sed Yield (%)
Mill Creek	23,249	94	2.6	4,586	20	8	8
Johns Creek	72,150	60	0.5	1,198	3	<1	1
Twentymile Creek	14,545	17	0.7	153	1	1	4
Tenmile Creek	34,410	24	0.4	336	1	1	1
Crooked River	45,659	137	2.0	4,616	10	6	8
Red River	103,348	588	3.6	22,939	22	12	24
American River	58,612	213	2.3	8,129	14	10	14
Newsome Creek	42,576	220	3.3	8,010	19	7	13
Silver Creek	16,509	27	1.1	1,097	7	5	3
Peasley Creek	9,112	55	3.8	2,016	22	13	20
Cougar Creek	7,731	48	4.0	1,750	23	12	15
Meadow Creek	24,115	164	4.4	7,684	32	11	16

- Watershed Area, Timber Harvest - From Watershed Database as of 12/11/97

- Roads, Road Density - From RMS (filename INFRA) GIS Overlay as of 10/21/97

- ECA - Projected 1997 % equivalent clearcut area from Watershed Database as of 1/13/98

- Sed Yield - Projected 1998 % sediment yield over base from NEZSED runs as of 8/20/96

Road densities relative to watershed condition have been rated on various scales, depending on the study and its assumptions. In the 1992 Nez Perce National Forest coarse filter analysis, road density less than 1 mile per square mile was rated "low", 1-3 miles per square mile was rated "moderate", and greater than 3 miles per square mile was rated "high". In the ICRB Science Assessment, less than 0.7 was "low", 0.7-1.7 was "moderate", 1.7-4.7 was "high", and greater than 4.7 was "very high".

ECA thresholds of concern have varied considerably, but typically range between 15% and 30% of third to fifth order watershed areas. Current criteria resulting from Endangered Species Act consultation have focused on 15% ECA as a trigger for further analysis in high priority anadromous watersheds.

Table 3.16 gives an indication of how impacts, primarily from roads and timber harvest, are distributed throughout the South Fork Subbasin. This is also illustrated spatially on Maps 12, 13, 14, and 21. Relatively, impacts from these two activities are heaviest in Red River, Newsome Creek, Peasley, Creek, Cougar Creek, and Meadow Creek. Intermediate levels of impact are found in Mill Creek, Crooked River, and American River. The lowest levels of impact are found in Johns Creek, Twentymile Creek, Tenmile Creek, and Silver Creek. More specific discussions of the effects of these activities are found in the ERU descriptions.

Water Yield

This term refers to streamflow quantity and timing. It is of concern since streamflow is a key determinant of the energy available for erosion, transport, and deposition of sediment within channels. Streamflow is also a key component in determining the morphology of channels, with implications for the quality and quantity of fish habitat. Finally, water yield is an important component in determining the availability and suitability of water for beneficial uses.

Water yield quantity and timing can be altered by compaction or disturbance of the ground surface, as with roads and skid trails. Water yield is also affected by vegetation growth or removal. Water yield generally increases after timber harvest through a reduction in transpiration and precipitation interception losses. Removal of forest canopy also affects snow accumulation and melt processes, often resulting in an increase in snowpack accumulation and melt rates, thereby increasing runoff rate and volume.

Water yield increases can be directly modeled, but equivalent clearcut area (ECA) is often used as a surrogate. ECA is usually expressed as a percent of watershed area. The index takes into account the initial percentage of crown removal and the recovery through regrowth of vegetation since the initial disturbance. Figures 3.1 and 3.2 show the history of ECA in the South Fork Subbasin and selected tributary watersheds, by decade, from 1870 through 2000. The residual ECA from fires prior to 1870 is unknown, since no fire history data are available prior to that time. From the 1870s through the 1950s, this analysis reflects ECA from wildfire effects, as estimated from reconstruction of the fire history. From the 1960s to the present, ECA is additionally affected by timber harvest and roads.

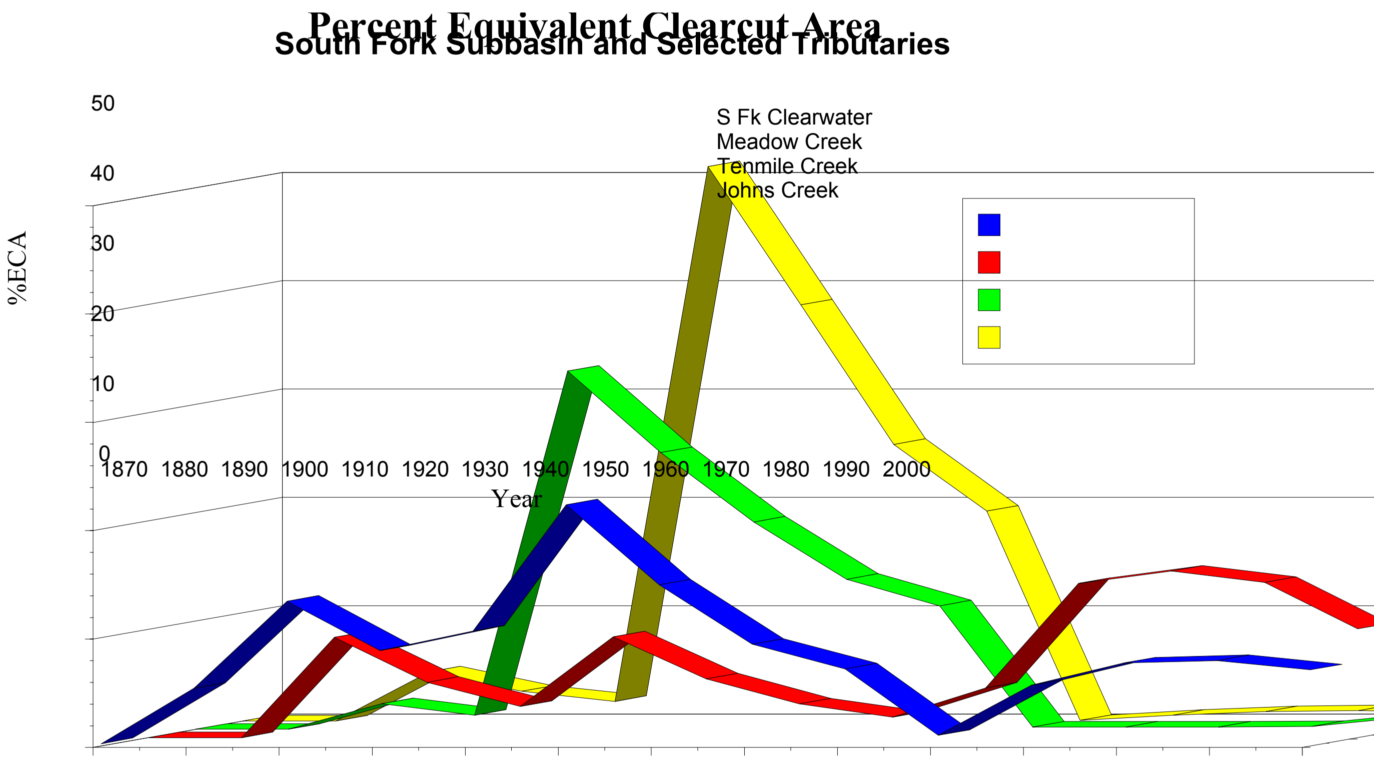


Figure 3.1 shows overall ECA in the South Fork Subbasin above the Forest Boundary, as well as ECA for Meadow, Johns, and Tenmile Creeks. For the South Fork Subbasin as a whole, the analysis suggests that ECA was highest in the 1890s and 1920s with levels between 10% and 25% of the subbasin area. Since the 1970s, subbasinwide ECA has hovered around 6% to 8%. In Meadow Creek, fire history ECAs peaked at about 9%, whereas recent ECAs have ranged from 10% to 15%. ECA in Tenmile and Johns Creeks peaked in the 1910s and 1920s at about 30% and 50%, respectively. Current ECA levels are near 1% in both watersheds.

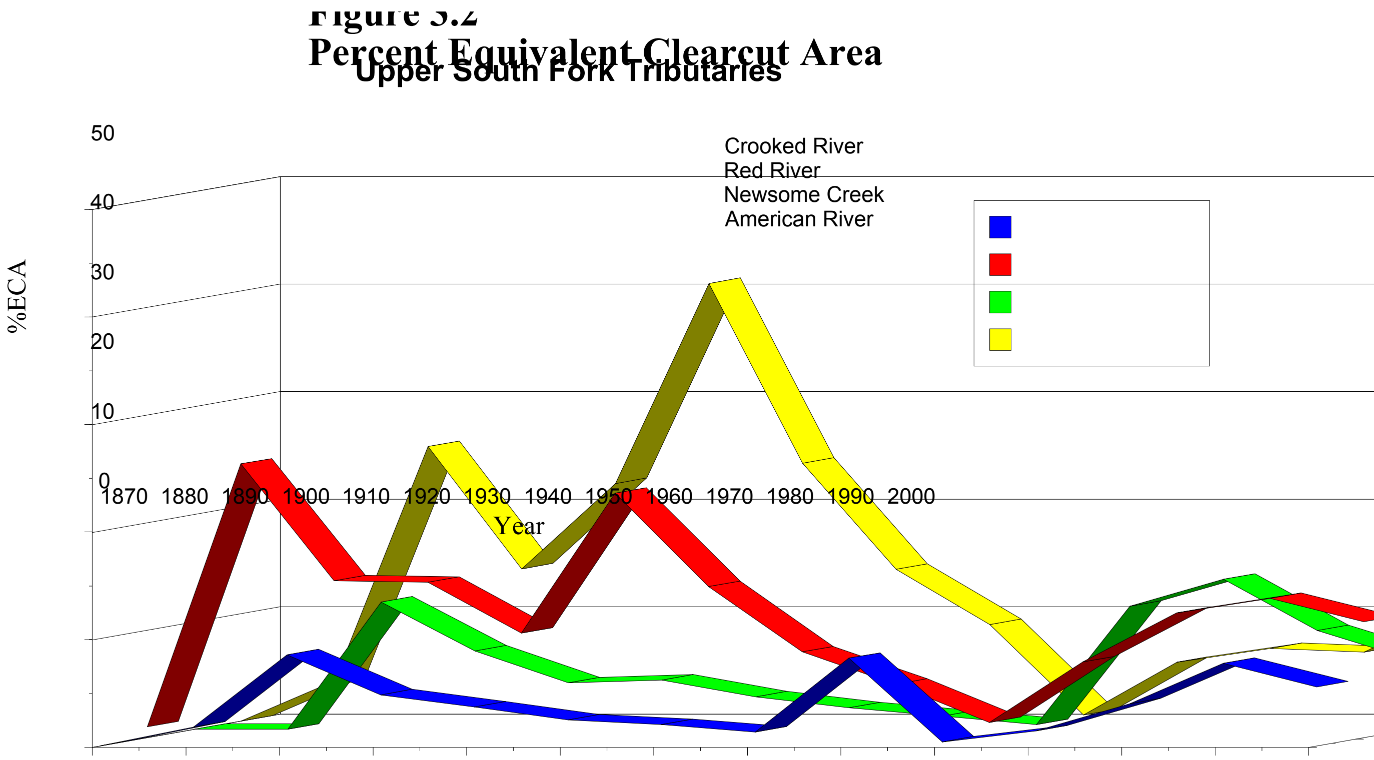


Figure 3.2 shows ECA in the major upper South Fork tributary watersheds. In Crooked River, ECA from the fire history analysis peaked at about 8% in the 1890s and 1950s, and recent ECAs are in the range of 4% to 8%. In Red River, fire history ECAs peak in the 1880s and 1920s between 20% and 25%, and recent ECAs are in the range of 10% to 13%. In Newsome Creek, the fire history ECA peaked in the 1890s at about 12% and recent ECAs have ranged between 6% and 14%. In American River, the fire history ECAs peaked in the 1890s and in the 1940s between 25% and 40%. Recent ECAs have ranged from 5% to 10%.

Across the South Fork Clearwater Subbasin, it appears that historic ECAs due to wildfires periodically exceeded the ECA levels resulting largely from timber harvest and roads since the 1960s. Of the watersheds analyzed, exceptions to this pattern are Meadow Creek, Crooked River, and Newsome Creek. Thus, it is reasonable to assume that water yields have decreased somewhat relative to historic levels. A factor working against this premise is the increased compacted area from roads and skid trails, which would tend to increase runoff efficiency and peaks flows in particular. Given enough time (perhaps on the order of decades), stream channels would be expected to adjust to the changed flow regime. If more ECA is created in the future through fire or timber harvest, water yields would be expected to increase, along with some possible channels adjustments. This adjustment would probably be most pronounced in first and second order headwater streams.

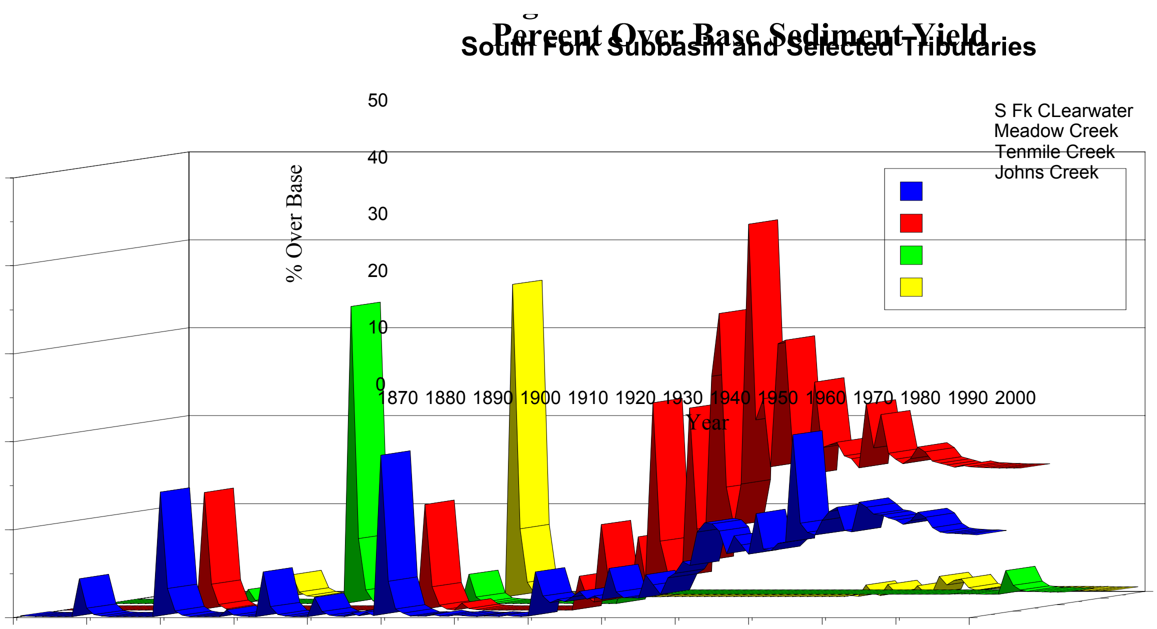
Sediment Yield

This term refers to the movement of sediment through the stream channel system. It is typically expressed as tons per year or percent over base (synonymous with percent over natural). Sediment yield can be sampled in the field with a variety of methods. Most commonly, this is done by sampling suspended sediment, bedload sediment, and stream discharge. Another method is through the use of sediment detention basins. Sediment yield can also be modeled using one of several approaches. For this analysis, sediment yield was modeled using NEZSED, which is a computer model tiered to a set of guidelines developed by hydrologists and soil scientists from the Intermountain Research Station and the Northern and Intermountain Regions of the Forest Service (USDA Forest Service, 1981).

Sediment yield is an important indicator of watershed condition since it integrates the effects of upslope and in-channel conditions. It has a direct link to fish habitat quality as well as to other beneficial uses of water. Sediment yield is related to turbidity and often has a high correlation to fine sediment deposited in stream substrate.

For this analysis, sediment yield was modeled for the period 1870 through 2000. During 1870 through 1939, the analysis included natural long term baseline sediment and the effects of historic wildfires. From 1940 through 2000, the analysis includes natural baseline, plus the effects of fire, timber harvest, and roads. Of these activities, the model suggests total sediment yield recovery from fire and timber harvest by the fifth and seventh year, respectively, after the activity. The model predicts a continuing sediment production from roads as long as they remain on the landscape.

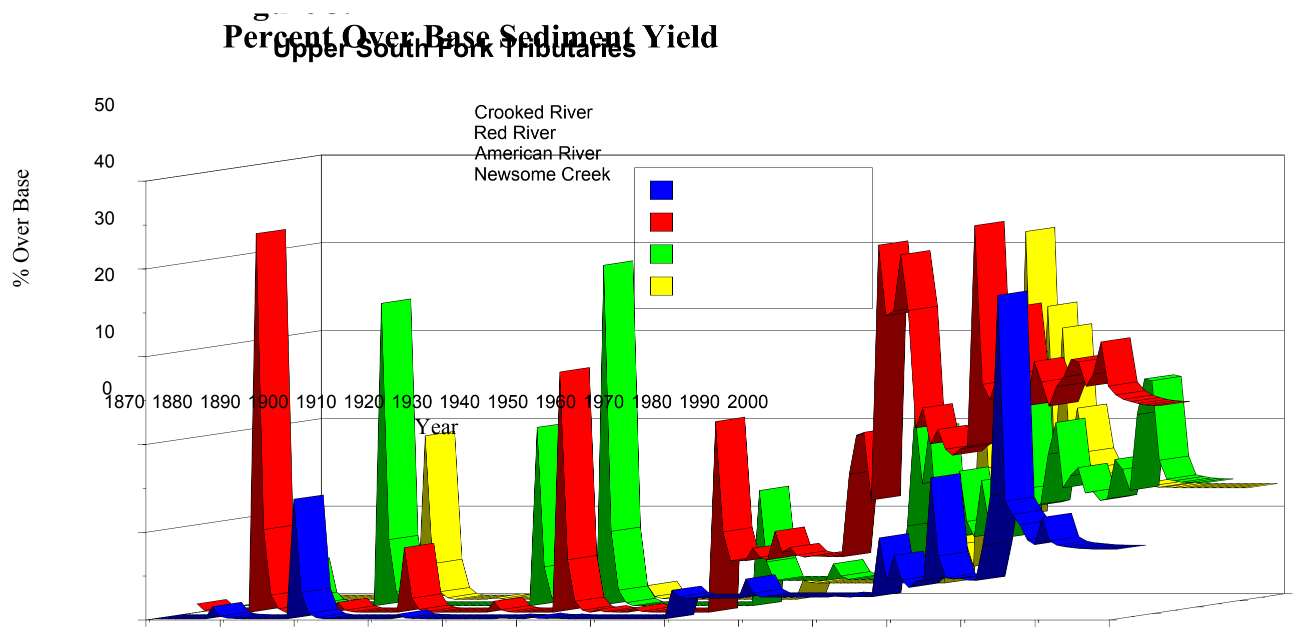
The NEZSED analysis does not include the effects of mining or grazing. It also does not include the effects of activity-induced mass erosion. Road effects are probably underestimated during the period from 1940 through about 1980. The reason is that sediment mitigation measures were not as refined during that period, but technical limitations of the model would have made it very difficult to account for this difference. Thus, roads built during this period were modeled with their current mitigation values, rather than those that would have been in place when initially constructed. The two graphs below show modeled sediment yield, expressed as percent over base, for selected areas of the South Fork Subbasin.



Map 28 shows current sediment yield rates as compared to natural base sediment yield rates.

Figure 3.3 shows two distinct patterns of sediment yield. The patterns for the South Fork Subbasin (at the Forest Boundary) and Meadow Creek are similar, in that development era sediment yields are greater overall than historic yields. The magnitude of development era peaks are substantially larger in Meadow Creek. The development era peaks for both watersheds are probably underestimated due to the model limitations described above. A major difference between the historic and current sediment yields in Meadow Creek and the South Fork Subbasin is the long term, chronic sediment yield resulting from roads. Sediment yield after fires tends to recover relatively quickly, but road systems tend to produce sediment for long periods. This appears to have substantial implications for deposition of fine sediment, particularly in low gradient channels.

The other pattern in Figure 3.3 is that displayed for Tenmile and Johns Creek. These watersheds had relatively large sediment peaks in response to wildfires in 1903 and 1919, respectively. However, recovery from those peaks was expected to be fairly rapid and the low levels of development have resulted in only relatively minor peaks over base since 1940.



The sediment yield pattern shown in Figure 3.4 is similar for all four of the major upper South Fork Clearwater tributaries, though the magnitude of percent over base varies by watershed. The basic pattern is that the peaks resulting from wildfire are of similar magnitude as the development-era peaks, but that the chronic sediment yield between peaks has been progressively increasing since roading began. This pattern is somewhat different in Crooked River, where the fire peaks are substantially less than the development peaks. Red River is noteworthy in that it currently shows the highest residual level of sediment yield over natural of the major tributary watersheds analyzed.

NEZSED has been tested against field-sampled data at two scales of watersheds within the South Fork Subbasin (and at other sites across the Nez Perce National Forest). One of these studies evaluated data from Red River, South Fork Red River, and Trapper Creek (Gloss, 1996). These data consisted of an intensive set of suspended and bedload sediment samples, along with streamflow gaging. In general, this study found that NEZSED underpredicted sediment yields when compared to observed data from field sampling during water years 1986 through 1993. For these three stations, field-sampled sediment yields averaged about 30 tons/square mile/year and modeled sediment yields averaged about 12 tons/square mile/year. In general, the model predicted better in average to below average water years, and more significantly under predicted in above average water years.

The other study was a comparison of field-sampled versus modeled sediment yield at the Mt. Idaho Bridge (near the Forest Boundary). The field sampling was done between 1988 and 1992 and consisted of a relatively small set (n = 52) of suspended sediment samples. When worked up as annual sediment yield, these data suggest an annual sediment at this site of 17,880 tons/year, or about 22 tons/square mile per year. Sediment yield predictions at this site, based on NEZSED, are 15,080 tons per year, or about 18 tons/square mile/year.

In a 1988 field study, turbidity data were collected at various points in the South Fork Clearwater River and certain tributaries (Idaho Department of Health and Welfare, 1991). Two of the main stem sites were near the Forest Boundary and at Stites. Estimates of suspended sediment concentration made from these turbidity data suggest a 30% to 50% increase in suspended sediment concentration between the Forest Boundary and Stites (USDA Forest Service, 1995). Near the peak flow during the flood of February, 1996, a suspended sediment sample of 4,800 mg/l was collected near Kooskia. These data suggest a substantial increase in suspended sediment concentration below the Forest Boundary.

Water Temperature

The Biological Assessment for the South Fork Clearwater River discussed water temperature as one of the limiting factors for salmonids (USDA Forest Service, 1995). Water temperature is primarily affected by channel morphology, streamflow, solar radiation, and ambient air temperature. The most sensitive channels to high summer temperatures are wide, shallow streams with poor shade cover from riparian vegetation or topographic shading. These conditions are often caused or exacerbated by human activities, such as grazing, dredge mining, road placements, riparian timber harvest, etc. Excessive sediment deposition can aggrade channels, leading to wider, shallower streams that are more subject to water temperature increases.

Water temperature is a major factor contributing to habitat quality for fish. For example, preferred rearing temperatures for juvenile chinook salmon are between 12° and 14° C (Brett, 1952). Salmonid eggs and juveniles are more sensitive to high temperatures than adults. Lethal levels for adult salmonids vary according to factors such as acclimation temperature and duration, but are generally in the range of 20° to 25° C. Winter temperatures can be a problem, too. Velson (1987) reported high mortalities for developing embryos and alevins of Pacific salmon and steelhead when water temperatures were below 2° to 3° C. State water quality criteria for water temperature are in place for salmonid spawning, cold water biota, and bull trout spawning and rearing.

Information on water temperature for the South Fork Subbasin is currently being compiled, but relatively little analysis has been completed to date. It is known that summer temperatures, in particular, commonly exceed desirable and critical ranges for salmonids at numerous locations in the subbasin. Within the subbasin, stream channels most sensitive to temperature concerns are associated with the lower gradient, unconfined stream systems. These including the major tributaries of the upper South Fork, the streams draining the Camas Prairie, and in the lower mainstem South Fork. Streams with the most favorable summer temperatures are those that reside in well-shaded, confined valleys, particularly at higher elevations. Summer temperatures can vary widely from year to year, depending on streamflow levels and weather.

An example of the year to year variability of summer water temperature can be found by comparing the years 1993 and 1994 in lower Red River. 1993 was a relatively cool, wet summer and 1994 was a hot, dry summer. From thermograph records it was determined that, in 1993, water temperature exceeded 18° C on 11 days and the maximum instantaneous temperature was 19° C. Conversely, in 1994, water temperature exceeded 18° C on 52 days, it exceeded 22° C on 12 days, and the maximum instantaneous temperature was 24° C.

In the mainstem South Fork Clearwater River, water temperature increases significantly between the Forest Boundary near Mt. Idaho Bridge and the mouth. For example, in 1992 at Mt. Idaho Bridge, the river exceeded 20° C on 14 days, and the maximum instantaneous temperature was 22 degrees C. During the same period at Stites, the river exceeded 20° C on 34 days, and the maximum instantaneous temperature was 27° C.

Water Quality Limited Streams (WQLS)

These water bodies are listed under Section 303(d) of the Clean Water Act as not meeting applicable water quality standards. The current list of water bodies for Idaho was compiled by the Environmental Protection Agency and the Idaho Division of Environmental Quality in response to a lawsuit and subsequent court ruling. TMDLs must be developed for each water quality limited stream for the pollutants that impair water quality in each stream.

Within the entire South Fork Clearwater Subbasin, there are 50 streams and 1 lake listed as WQLSs. With the exception of the mainstem South Fork, sediment is the pollutant of concern. For the mainstem South Fork, the pollutants or parameters of concern are water temperature, sediment, and habitat alteration. A Watershed Advisory Group (WAG) is in the process of being formed to address TMDLs for Cottonwood Creek, a tributary of the lower South Fork. The State of Idaho currently has a schedule for completion of TMDLs for the remainder of the South Fork Clearwater Subbasin in 2002. Map 29 shows WQLSs, as well as municipal watersheds, for the South Fork Subbasin above the National Forest Boundary.

Forest Plan Fish/Water Quality Objectives
The Nez Perce National Forest Plan established fish/water quality objectives, sediment yield guidelines, and entry frequency guideline (USDA Forest Service, 1987). The objectives are documented in Appendix A of the Forest Plan and displayed for the South Fork Subbasin on Map 31. The current conditions with respect to Forest Plan objectives are displayed on Map 32.

Stream Channel Conditions
Streams in the upper part of the South Fork Subbasin have undergone a high degree of change from natural conditions. Dredge mining of the four major tributaries (Red River, American River, Crooked River, and Newsome Creek), as well as the upper mainstem South Fork was extensive. Dredge mining through the 1950s resulted in radically altered channel morphology, riparian vegetation, and fish habitat conditions. Instream improvement work during the 1980's was done with structural and non-structural approaches, but the channels generally were left in the location and pattern that remained after the dredge mining. Thus, it is unlikely that long term habitat objectives can be met. Other significant channel impacts in the upper subbasin include road encroachment, sediment deposition, and grazing.

Streams in the middle part of the subbasin have a wide range of current conditions. Tenmile, Johns, and Silver Creeks are relatively unimpacted and are probably functioning close to their natural potential. Conversely Peasley, Cougar, and Meadow Creeks have high impacts which include road encroachment and excessive sediment deposition. In addition, the McComas Meadows area of Meadow Creek has a long history of grazing, but is currently undergoing recovery. The single largest impact to the middle reaches of the South Fork mainstem is encroachment by Highway 14, though some reaches were also impacted by dredge mining and sediment deposition.

Streams in the lower part of the subbasin generally originate in low foothills, flow across agricultural land, and then flow through breaklands before entering the main stem South Fork. These are among the most highly impacted streams in the subbasin. Within the agricultural reaches, the channels have been heavily modified by vegetation removal, field plowing, channelization, and sediment deposition. Livestock feedlots and season-long grazing have impacted certain reaches. As the channels flow through the breaklands, erosion of the channel bed is common due to altered upstream and streamside conditions. When these streams reach the South Fork valley floor, their gradients drop considerably, and substantial deposition of bedload sediment has resulted in aggraded channels. This material is also delivered as excess bedload sediment to the main stem South Fork.

The main stem South Fork below the Forest Boundary has a mix of characteristics, as described in Chapter 2. Depending on the reach, sensitivity, and localized disturbances, the lower main stem channel has been variously affected by aggradation, channelization, diking, vegetation removal, and encroachment by developments, such as roads and buildings. The net result is a channel that is generally wider, shallower, and with less large pools than existed under natural conditions.

Riparian Conditions
Change in riparian function, as it relates to aquatic function, was assessed using: 1) historic mining activities in the riparian area (principally dredge mining); 2) roads that encroach on streams; 3) grazing effects on riparian function; 4) the amount of roads in the streamside area; 5) and the amount of past harvest in the streamside area. The first three items are displayed on Map 15. This information was compiled by district resource specialists. Item 4 was included in this analysis in addition to item 2, since they look at two different aspects of road effects on riparian function. Item 4 ratings are based on the road density classes described in the ICRB Science Assessment. These analysis items are summarized into a rating of riparian departure (the amount of change in inherent riparian function). Table 3.17 displays the analysis item ratings along with the summary riparian departure rating. Where the rating for columns 3 through 5 are low, they are not shown on the table.

Table 3.17 - Summary of Riparian Conditions

ERU	Major ALTAs	Level of Historic Streamside Mining	Level of Encroaching Roads	Level of Grazing Effects	Streamside Road Density	Streamside Harvest Density	Riparian Departure
Lower SFk Canyon	3	Moderate	Very High		High	High	Very High

Upper SFk Canyon	6,3	Very High	Very High		High	High	Very High
Lower Meadow	4,3,18		High	High	High	Very High	Very High
Upper Meadow	21,4,3		High		High	Very High	High
L. Cougar-Peasley	3,4		Very High		High	Very High	Very High
U. Cougar-Peasley	21				Moderate	Very High	High
Lower Silver	3,4				Low	Moderate	Low
Upper Silver	21,1				Very Low	Low	Low
Lower Newsome	6,3	Very High	Moderate		High	High	Very High
Upper Newsome	21,6				High	High	High
Lower American	6,18	Very High	Moderate	Moderate	High	Moderate	Very High
Upper American	6,21				Moderate	Moderate	Moderate
Lower Red River	6,18,21	Very High	High	High	High	Very High	Very High
Mid Red River	6,18,4		Moderate	Moderate	High	Very High	High
Upper Red River	1				High	Very High	High
Lower Crooked	3,21,6	Very High	High		High	Moderate	Very High
Upper Crooked	121		Moderate		Moderate	Low	Moderate
Lower 10 Mile	3,6,21				Low	Low	Low
Upper 10 Mile	1,2,5				Very Low	Very Low	Very Low
Lower E.Wing 20	6,18,21,3				Moderate	Moderate	Moderate
Lower W.Wing 20	21,3,6				Moderate	Moderate	Moderate
Upper Wing 20	1				Low	Low	Low
Lower Johns	3,4				Very Low	Low	Low
West Johns	4				Moderate	Moderate	Moderate
Upper Johns	1,2,5				Very Low	Low	Low
Lower Mill	3,4		Moderate	Moderate	High	High	High
Upper Mill	6,1				Moderate	High	Moderate

Ratings displayed in Table 3.17 were defined using the following measures:

- Level of historic mining, level of encroaching roads and level of grazing effects all use the following mileage categories:

  Very High: greater then 10 miles;
  High: between 5 -10 miles;
  Moderate: between 2 - 5 miles;
  Low: less than 2 miles (low ratings not shown on table)

- Streamside road density (using Quigley, 1997 road density classes):

  Very High: greater than 4.7 miles per square mile;
  High: between 1.7 - 4.7 miles per square mile;
  Moderate: between 0.7 - 1.7 miles per square mile;
  Low: between 0.11 - 0.7 miles per square mile;
  Very Low: less than 0.1 miles per square mile

- Streamside Harvest Density:

  Very High: greater than 15 acres of harvest per 100 acres of streamside area;
  High: between 5 - 15 acres of harvest per 100 acres of streamside area;
  Moderate: between 2 - 5 acres of harvest per 100 acres of streamside area;
  Low: between 0.5 - 2 acres of harvest per 100 acres of streamside area;
  Very Low: less than 0.5 acres of harvest per 100 acres of streamside area

Changes in riparian function have occurred from human activity. The greatest amount of change has occurred along the tributary mainstem rivers in the upper basin, along the South Fork Clearwater River, and along meadow sections. Historic mining and roads that encroach on riparian/stream areas are believed to have had the greatest effect on riparian function. These activities have resulted in press disturbances or semi-permanent alterations of the riparian environments. This type of regime alteration is not within the range of natural disturbances in these areas. The areas that have the greatest riparian departure (South Fork Clearwater River and tributary mainstems) represent some of the most valuable aquatic habitats in the subbasin.

Riparian Habitat Conservation Areas (RHCAs)

Riparian Habitat Conservation Areas (RHCA's) were established as part of the Forest Plan under Amendment 20 (PACFISH). RHCA areas are those parts of a watershed where riparian-dependent resources receive primary emphasis (Map 17). These are areas that have the greatest effect on the aquatic environment, and include areas adjacent to streams (streamside) and areas that are prone to landslides (landslide-prone). Lakes are not a major feature of the subbasin. While the RHCA is an area where specific Forest Plan standards and guidelines apply, it is used in this landscape assessment to represent the area that has a large influence on the aquatic ecosystem. The amount and type of RHCA within each of the ERUs is reflective of the landform and stream characteristics.

Table 3.17a RHCA Description by ERU

ERU	RHCA Area (acres)	% of ERU	Streamside Area	% of ERU	Landslide Prone Area	% of ERU
Mill Creek	7,006	30%	5,713	24%	1,694	7%
Johns Creek	26,412	36%	17,609	24%	10,250	14%
Wing/Twenty	6,967	35%	6,178	31%	1,102	6%
Tenmile Creek	13,136	38%	8,610	25%	5,261	15%
Crooked River	13,797	31%	12,039	27%	2,308	5%
Red River	32,308	31%	31,864	31%	629	1%
American River	20,682	35%	20,496	35%	427	1%
Newsome Creek	17,130	36%	16,212	34%	1,397	3%
Silver Creek	5,870	36%	5,253	32%	897	5%
Cougar/Peasley	5,578	33%	4,917	29%	1,025	6%
Meadow Creek	6,261	26%	5,757	24%	742	3%
South Fork Canyon	33,601	37%	23,408	26%	13,630	15%

The following table displays indicators of aquatic habitat condition based on activities within the RHCA. The amount of roads and harvest in the streamside areas and the landslide prone areas do not always add up to the amount of roads or harvest in the total RHCA due to roads and harvest that are in areas determined to be both streamside and landslide prone. The previous sections on stream channel condition and riparian conditions discuss other indicators of aquatic condition based on additional streamside activities (Map 15).

Table 3.17b RHCA Condition Indicators by ERU

ERU	Roads in RHCA (miles)	RHCA Road Density (mi/sq mi)	Harvest in RHCA (acres)	Stream side Roads (miles)	Stream side Harvest (acres)	Lands lide Prone Roads (miles)	Landsli de Prone Harvest (acres)
Mill Creek	21	1.96	589	19	558	3.1	34
Johns Creek	9	1.22	415	8	365	0.8	67
Wing/Twenty	9	0.84	256	8	241	1.0	18
Tenmile Creek	8	0.39	123	8	83	0.9	53
Crooked River	41	1.92	717	39	653	4.5	81
Red River	175	3.47	4,910	174	4,856	2.0	71
American River	62	1.93	925	62	905	0.9	29
Newsome Creek	55	2.04	1,291	52	1,210	3.7	96
Silver Creek	6	0.66	270	6	239	0.6	45
Cougar/Peasley	33	3.82	1,037	31	969	3.7	84
Meadow Creek	43	4.46	1329	42	1,198	2.2	149
South Fork Canyon	158	3.01	3,326	142	2,721	30.5	719

The default size of the RHCA's was used in this assessment. This assessment did not complete the analysis necessary to adjust the size of the RHCA. This assessment did build part of the foundation that will be needed to support changes in the RHCA. The ALTA is an important step in landscape classification necessary to stratify such analysis. Additionally, valley bottom and channel setting will need to be classified to complete this analysis. The scale of the South Fork Assessment is thought to be the correct one for completing the analysis necessary to recommend changes in the size of the RHCA. This subbasin scale is more appropriate than the watershed scale, although the analysis could be expanded to include larger areas, with appropriate stratification.

The default riparian management objectives (RMO's) established in Amendment 20 (PACFISH) were not considered in this assessment. In this case too, the combination of landscape, valley bottom, and channel setting will need to be appropriately stratified to make these values meaningful. Additionally, these values will need to be understood as frequency distributions that change spatially and temporally over time, and not as static conditions. The scale of this assessment is appropriate for completing this type of analysis as well.

Summary of Watershed, Stream, and Riparian Conditions
Physical aquatic conditions in the South Fork Subbasin have changed substantially since the initiation of significant human disturbances in the 19th century. Perhaps the most impactive alterations of upland conditions are road development throughout most of the subbasin and the conversion to agricultural crops in the lower part of the subbasin. The general effects of roads include erosion of exposed soils and the extension of channel networks through interception of water and routing through ditchlines. Changes on upland agricultural fields include long term exposure of soils to surface erosion and extension of the channel system through gullying. It is important to note that there are still significant areas within the forested portions of the South fork Subbasin where upland watershed conditions are relatively intact.

Stream channel and riparian conditions have similarly changed with development of the subbasin. The most significant impact in the upper part of the subbasin is probably the dredge mining that occurred in most of the major upper tributaries, as well as the upper main stem South Fork. Although substantial investment in instream improvements has occurred in these streams, conditions are still considered to be below objectives and recovery is a long term proposition that will require additional improvement measures. Encroachment by roads and other developments is another significant impact on stream and riparian conditions. Opportunities exist to reduce this impact through road removal and enhanced road mitigation measures. Finally, streams have been impacted through changes in streamflow and sediment regimes. The degree of these impacts vary widely across the subbasin and will require watershed and stream-specific prescriptions to ameliorate.

Aquatic Species

Bull Trout

Species Background - General

Status - Bull trout are recognized as a species of special concern by State management agencies and the American Fisheries Society, and as a sensitive species by the Forest Service and BLM (ICRB Component Report). The U.S. Fish and Wildlife Service has proposed bull trout for listing under the ESA in the Columbia River Basin. The State of Idaho has developed a Bull Trout Conservation Plan, with the stated mission to "maintain and/or restore complex interacting groups of bull trout populations throughout their native range in Idaho" (Idaho, 1996).

Distribution - The historic range of bull trout included most of the Columbia River Basin. Their current range occupies about 44% of the estimated historic range, with the core of the remaining bull trout distribution in the Central Idaho Mountains, which includes the Clearwater river basin (ICRB Component Report).

Life History/Habitat Requirements - Bull trout exhibit two distinct life history forms, resident and migratory. Resident populations generally spend their entire lives in small headwater streams. Migratory bull trout rear in tributary streams for several years before either migrating into larger river systems (fluvial) or lakes (adfluvial) (Idaho, 1996). These divergent life histories are viewed as alternative strategies that contribute to the persistence of populations in variable environments. Migratory fish are believed to be critical for both genetic exchange between local populations and population refounding/rebuilding, due to their much higher fecundity. Both forms are believed to exist together in some areas, migratory fish may dominate populations where corridors and subadult rearing areas are in good condition (ICRB Component Report). Resident fish are much smaller then migratory forms of bull trout (Idaho, 1996). Bull trout are fall spawners.

Bull trout appear to have more specific habitat requirements than other salmonids (Idaho, 1996). Strong bull trout populations require high stream channel complexity, including in stream wood and substrate with clear interstitial spaces (Idaho, 1996). Temperature is a critical habitat requirement for bull trout, with their distribution generally associated with the coldest stream reaches within basins. The lower limit of bull trout distributions in the ICRB Component Report analysis corresponded to a mean annual air temperature of about 4 degree C, and temperatures above about 15 C (59 F) are thought to limit bull trout distribution (Idaho, 1996). Additionally, channel stability, winter high flows, summer low flows, substrate, cover, temperature, and the presence of migration corridors appear to influence bull trout distribution and abundance (Idaho, 1996).

Key Factors/Threats - There are four key factors that are believed to represent the greatest influence on bull trout populations; 1) harvest of adults, 2) watershed disruption, 3) introduced species, and 4) isolation and fragmentation of populations (ICRB Component Report).

The harvest of adult bull trout includes authorized angling, incidental harvest, and poaching. Legal harvest of bull trout has been eliminated by state management agencies throughout most of its range. Incidental harvest has been identified as a potential problem in association with expanding lake trout fisheries. Poaching is viewed as an important cause of mortality, especially in accessible streams that support large migratory fish (ICRB Component Report).

Watershed disruption is recognized as a factor in the decline of bull trout. Changes in sediment delivery, aggradation and scour, wood loading, riparian canopy and shading (or other factors that influence stream temperature), and the hydrologic regime are all likely to affect populations (ICRB Component Report). The ICRB Science Assessment concluded that significant long-term changes in any of these characteristics or processes represent important risks for many remaining bull trout populations.

Introduced species are viewed as a third factor influencing bull trout, by depressing or replacing bull trout populations. Brook trout are seen as an especially important problem. Introduced species may pose greater risks to native species where habitat disturbance has occurred (ICRB Component Report).

Isolation and fragmentation are another factor likely to influence the status of bull trout. Historically bull trout populations were well connected throughout the Columbia River Basin. The ICRB Science Assessment found evidence from population monitoring that dispersal capabilities may be particularly important to bull trout, as suggested from metapopulation theory. Isolation of populations in shrinking habitat will probably lead to increased rates of extirpation not proportional to the simple loss of habitat area. Even with no further habitat loss, extirpations may be likely for many remaining isolated populations. Long-term conservation of bull trout may well depend on maintenance or restoration of networks of high quality habitats, and of migratory corridors that connect these areas.

Bull Trout Specific To The South Fork Clearwater Subbasin

Status/Basin Context - Bull trout in the subbasin are part of the Columbia River ecologically significant unit (ESU). The U.S. Fish and Wildlife Service has proposed bull trout in this ESU for listing under the ESA. The South Fork Clearwater River represents an important metapopulation of bull trout within the Snake River. The State of Idaho has identified the South Fork Clearwater Subbasin as a key watershed for bull trout in the State's Bull Trout Conservation Plan.

Habitat Potential - The subbasin has a high inherent capability to support bull trout populations. This is based on general features including climate, elevation, relief, and geology. Habitat capability is discussed as it relates to: 1) the habitat capability of the basin to support bull trout spawning and rearing (early rearing for migratory fish), 2) the subbasin's capability to support migration and late rearing of fluvial fish (subadult/adult rearing), and 3) the subbasin's capability to support a metapopulation, or connection of local populations, or bull trout.

***Historic Spawning and Early Rearing Habitat Potentia*l** - Bull trout require stable, complex, cold stream environments. Stream reaches vary in terms of their inherent capability to provide these conditions. Additionally, the landscape setting of the stream channel is important in terms of the types, frequency, and magnitudes of natural disturbance events that affect the condition of the channels. The ALTA's can be used to describe spawning and early rearing habitat capability, because they represent a mixture of stream types (frequency of channel types) and a disturbance setting.

The high elevation complex of ALTAs (ALTA 1, 2, and 5) found in upper Johns, Tenmile, Crooked and Red River provide inherently stable environments and stream conditions for bull trout spawning and early rearing due to the low disturbance frequency (Map 6). These areas provide stable, complex spawning and rearing habitat, and the water temperature is very cold (due to the elevation). This complex of ALTAs provide a very high habitat potential for bull trout (Map 33a). The productivity of these areas is lower than other parts of the subbasin (also due to the elevation), and the populations in these ALTAs are thought to have only moderate resilience to disturbance events. The probability of these populations persisting is high, due to the disturbance setting. However, when a disturbance does occur, the populations ability to persist or rebuild is low to moderate. Connectivity to other populations (both within watersheds and within the subbasin) is critical for the long-term persistence of these populations, so that refounding after disturbance can occur.

The mid to upper elevation low relief hills and alluvial valleys (ALTA 6 and 18), found predominantly in Newsome, American, and Red River, provide aquatic habitat of high to very high potential for bull trout. These areas are dominated by low to moderate gradient channels with high inherent habitat capability. The disturbance regime of these ALTAs provide for long periods of stable channel conditions, including clean substrate. These areas are more productive than the higher elevation complex (discussed above), and have a higher habitat capability, while the disturbance frequency is greater. The resistance of these individual populations is thought to be lower due to the higher disturbance frequency, while the resilience of these populations is very high due to both the higher habitat capability and the basin setting. These basins have low gradient channels in a dendritic pattern that provides for dispersal of populations across the landscape, where only a portion of the population within a watershed is affected by a disturbance. The close proximity and the high habitat capability provide for high rates of refounding within the watershed. The overall capability and setting of these ALTAs make them the likely population source areas for the subbasin.

Another area of the subbasin that has a moderate to high potential to support bull trout is the mountain uplands (ALTA 21). This ALTA includes a range of channel conditions, primarily A and B channels, with sections of low to moderate gradient bull trout spawning and rearing habitat (B3 & B4 channel types). See Appendix C for channel type descriptions. On the South side of the subbasin, these areas are generally found in conjunction with the previously discussed high elevation complex. On the North side of the subbasin, these areas are thought to have good flow (due to the moist climate), but higher overall temperatures due to the lack of the high elevation colder water inputs. These areas can be thought of as watershed scale adjunct habitats for bull trout, with a patchy distribution of habitats with high capability.

The remainder of the subbasin is composed of the low elevation breaklands and low elevation low relief hills (ALTA 3 and 4). These areas are considered to have a low to moderate capability for bull trout spawning and early rearing. Both of these areas include channel types that provide suitable habitat for bull trout (especially ALTA 4), but it is believed that the water temperatures in these areas are too high to support long-term populations of bull trout. At the subbasin level, these areas provide adjunct habitat for bull trout and can be expected to have relatively short periods of persistence. The role of adjunct habitats as population sources during their occupation is very well understood. The habitat potential of the subbasin for bull trout is summarized on Map 33a.

***Current Spawning and Early Rearing Habitat Potentia*l** - The high elevation ALTAs (ALTA 1, 2, and 5), found in upper Johns, Tenmile, Crooked and Red River, have an inherently high habitat capability for bull trout. The aquatic processes and habitat condition in these areas of the subbasin have been impacted the least by human activities. Upper Red River is the primary exception to this. This area maintains much of its natural aquatic process and characteristics, including stable, complex, cold streams.

The mid to upper elevation low relief hills and alluvial valleys (ALTA 6, 18), found predominantly in Newsome, American, and Red River, provided historic aquatic habitat with high productivity for bull trout. In contrast, these areas, in general, represent the greatest amount of change in processes and conditions within the subbasin. There has been a significant reduction in bull trout habitat capability in these areas due to changes in the characteristics or processes that represent important risks to bull trout in terms of watershed disruption, including sediment regimes and riparian function. These areas still support bull trout and still would rank as moderate to high in existing habitat capability. However, the population resilience, and potential of this area as a population source for the subbasin, is believed to have been significantly reduced.

The mountain uplands (ALTA 21), provided a diversity of habitat capabilities for bull trout, based on the variation in channel conditions (Map 33b). In a continuation on this theme, the reduction in habitat capability in these areas from human activities has been variable and patchy. While in some areas the capability remains high, in other areas the capability is moderate to low as a result of either inherent conditions or human activities.

The low elevation breaklands and low elevation low relief hills (ALTA 3 and 4) of the subbasin do not have an inherently high capability for bull trout spawning and early rearing. There has been considerable human activity in much of this area, and the habitat potential of these adjunct areas has been reduced.

In summary, the habitat potential of the subbasin for bull trout spawning and rearing has been selectively reduced. Much of the high elevation habitat (ALTA 1, 2, and 5) remains in good condition, while in the mid to high elevation low relief hills and alluvial valleys (ALTA 6 and 18), in the upper basin, there has been considerable habitat degradation. This has resulted in a reduction in the bull trout spawning and early rearing potential in these areas.

Historic Subadult/Adult Rearing Habitat Potential - Migratory bull trout use larger streams for rearing after about age 2 or 3. These fish return to their smaller natal stream to spawn. The habitat requirements for these migratory fish have not been researched to the extent that the spawning and early rearing habitat requirements have been described. It is believed that similar rearing habitat is required, including high levels of complexity and pools, while the requirements for colder temperatures and stability do not seem to be as limiting.

The South Fork Clearwater subbasin has a inherently high habitat capability to support migratory bull trout, principally in the tributary mainstems and the South Fork Clearwater River itself. These moderate to large rivers are believed to have provided complex habitats with lots of woody debris and pool habitat. This is particularly true for channels that are not highly constricted by the adjacent valley bottoms, including American, Red, and portions of Newsome, Crooked and Tenmile. It is believed that this high quality subadult/adult rearing habitat in these tributary mainstems provided for bull trout populations in these areas that were largely migratory.

Current Subadult/Adult Rearing Habitat Potential - The South Fork Clearwater subbasin's inherently high habitat capability to support migratory bull trout, principally in the tributary mainstems and the South Fork Clearwater River itself, has been substantially reduced. This change in aquatic process and conditions, through human activities, is believed to be the greatest deduction of habitat potential for bull trout in the subbasin. These mainstem channels have been the location of much of the human activity in the basin, including; mining, road building, grazing and timber harvest. And these areas have been influenced by the upstream activities as well. These channels have lost much of their channel pattern and morphology, complexity, pool volume, and woody debris. The exceptions to this are the tributary mainstems of Johns Creek and Tenmile Creek. This reduction in habitat potential has significantly reduced the subbasin's habitat potential for subadult/adult bull trout rearing, in that the highest potential areas have been degraded the most.

Historic Watershed Connectiveness - While you can rate an individual watershed's habitat capability to support a population of bull trout, the subbasin in the appropriate scale to consider the connectiveness between watersheds and populations within them. As mentioned, long-term persistence of bull trout is considered dependent on the interconnection between populations.

The South Fork Clearwater River has an inherently high level of connectiveness, particularly between the watersheds that have the highest capability for bull trout. There are no natural barriers to migration either in the mainstem South Fork Clearwater River or the tributary mainstems of watersheds that have a high to very high habitat capability rating for bull trout. The Twentymile and Silver Creek watersheds have natural barriers from the remainder of the subbasin, and these watersheds have a moderate rating for inherent bull trout capability. Bull trout have not been found in either of these watersheds, except in the lower portions of these streams that are connected to the SF. It is believed that the historic balance between resident and migratory life histories varied in the subbasin. The more linear watersheds of Johns and Tenmile probably supported bull trout populations dominated by resident life histories, while the watersheds of the upper basin supported populations dominated by a migratory life history. This is due to the longer distances, elevation difference, and high gradient and energy characteristics of the Johns and Tenmile mainstems. The bull trout populations in the upper basin are believed to have been highly connected.

Current Watershed Connectiveness - Today the subbasin retains a high level of connectiveness between watersheds in the respect that there are no physical barriers to migration. But the overall connectiveness of the subbasin has been reduced through loss of habitat in the tributary mainstems. The loss of habitat in these streams, increasing the distance between good or refuge habitats and strong populations, has reduced the likelihood of effective dispersal. An example of this is Crooked River, where the upper watershed has high quality habitats for bull trout, but the migratory corridor (Crooked River) has had a significant reduction in habitat quality that provides for migration to and from the upper watershed.

Species Distribution - Historic bull trout distribution is believed to have been throughout most of the subbasin. Bull trout were likely found throughout the high to very high potential spawning and early rearing areas, although these populations probably varied both spatially and temporally. Migratory bull trout were likely found through the subbasin, with concentrations in the tributary mainstems.

Currently, bull trout are found throughout most of the subbasin, with both migratory (fluvial) and resident forms being present. Resident populations are located primarily in the upper basin and at higher elevations. Migratory fish are found throughout the watershed, although the larger number of these are found in the upper basin.

Map 33a and 33b displays the current known distribution of bull trout in the subbasin (red line). This distribution is based on agency or tribal inventories using accepted scientific procedures. There are areas of the subbasin that have not been inventoried, where bull trout are suspected to occur, these areas are not shown on this map. Additionally, recent inventory data where bull trout have been located has not been entered into the fish distribution database and is not shown on these maps. These maps should not be used to determine the present/absence of the species in a particular stream, but are intended to give the reader a overall view of distribution in the subbasin.

Species Abundance - The historic abundance of bull trout in the subbasin is not well documented. No historic data that describes local densities or population distributions exists. However, anecdotal observations of bull trout can be used to infer historic abundance. There are indications that there were large numbers of fluvial bull trout in the upper basin. Family members of a permittee who held a sheep grazing permit in Tenmile watershed until the 1960s recall seeing large bull trout in the pools in Tenmile meadows (upper Tenmile). Reports mention fish up to 27 inches in length, and as many as 15 fish in each of the two or three deepest pools. Large (greater than 17 inch) fish were observed in this area in 1987, the number of them unknown. A survey of this area in 1993 and 1994 located only one bull trout over 12 inches. Most anecdotal evidence speaks to the presence of large fluvial fish in the upper basin, with little insight into the distribution or densities of local spawning populations.

The current abundance of bull trout in the subbasin is low. It appears that the number of large migratory fluvial fish in the subbasin has been dramatically reduced and is currently at a very low level. Smaller migratory fish are still found throughout most of the upper basin, the number of these being low. The Idaho Department of Fish & Game, Forest Service and BLM initiated an interagency bull trout study in the

South Fork subbasin in 1993 with the objectives of: 1) describing basic life history of bull trout in the South Fork, 2) describing the temporal and spatial distribution of bull trout in the South Fork, and 3) determining factors limiting bull trout in the South Fork. This study continues, and conclusions can not yet be reached related to this effort. However, to date, it appears that the number of bull trout spawning populations are low, with the densities within these populations being low. Most bull trout found appear to be migratory subadults. And no large migratory bull trout have been found.

The ICRB Component Report initiated a process whereby the distribution and population strength of key salmonids, including bull trout, was assessed. The Forest evaluated species distribution and density data to identify, where possible, the population strength of bull trout spawning and rearing populations. No bull trout populations in the South Fork subbasin were classified as 'strong', based on the criteria established by the ICRB Aquatic Component Report, pages 1146 to 1148. Where sufficient information existed to classify the population strength using this criteria, all populations were classified as weak or depressed.

Population Dynamics and Viability - The subbasin is believed to represent a functional metapopulation for bull trout, although migratory fish from this subbasin may migrate to the lower Clearwater River and mix with bull trout from other parts of the Clearwater Basin. Historically, this metapopulation is believed to have been distributed throughout the high potential spawning and early rearing areas in the subbasin, and connected through dispersal of large migratory fish throughout the subbasin. Currently, there has been a significant loss of large fluvial bull trout, and associated subadult/adult rearing habitat quality. There are indications that the number of, and densities within, local spawning populations have also been reduced. The long-term stability of the metapopulation has been decreased by the reduction in migratory habitat and fish. Both the local population resistance and resilience have been reduced, with the exception of some populations in the higher elevation ALTAs which are thought to been primarily resident populations (Johns Creek).

Subbasin Key Factors/Threats - The key factors and threats to bull trout identified in the ICRB Science Assessment are applicable to bull trout in the South Fork subbasin, and will be used to discuss the current factors and threats to bull trout in the South Fork subbasin.

Harvest of Adult **-** Harvest of adults is considered to have had a significant impact on the number of large migratory fish in the subbasin. Most of the larger order streams have easy access from streamside roads. The exceptions to this are Johns and Tenmile Creeks. With the current restrictions on harvest of bull trout, this threat has been reduced. However, given the easy access, simplified habitat in these streams, people fishing for other species, and the remoteness of these areas, the illegal harvest of bull trout is probably still a threat to the species.

Watershed Disruption **-** A large part of the high to very high potential habitat in the subbasin has been degraded through human activity, and alteration of disturbance regimes. However, large amounts of high quality habitat still exists in the subbasin (Johns Creek, Tenmile Creek and upper Crooked River). Most bull trout habitat is found on the National Forest. Given the current standards and planning procedures for national forest activities, the threat of future watershed disruption has been reduced, although the risk still exists. The key factor related to watershed disruption will be the ability to establish restoration efforts that reverse the watershed disruption of the past.

Introduced Species **-** Brook trout are a threat to bull trout in the South Fork. See Map 37 for a display of brook trout distribution. The threat from brook trout is the lowest in the watersheds with the best habitat condition (Johns and Tenmile Creeks). Hybridization and competition with brook trout is a threat that needs to be addressed, especially in areas where brook trout populations are not fully established.

Isolation and Fragmentation **-** Long-term population viability is believed to rely on the interconnection of local populations in a metapopulation. Isolation and fragmentation are considered to increase the risk of local population extinction, and reduce the likelihood of population refounding. The loss of large migratory fish and the reduction in habitat condition in the large tributary mainstems and the South Fork Clearwater River itself, are considered key threats to the population by isolating the remaining populations.

<u>Summary of Bull Trout Habitat and Population Status</u>

To summarize the current status of the habitat and populations of bull trout, a classification system that considers habitat potential, habitat condition, and species population status is used.

Areas with high to very high habitat potential are described as: 1) strongholds, when habitat condition is good, and the population is strong; 2) population strongholds, when the population is strong, and the habitat condition has been degraded; 3) habitat strongholds, when the habitat condition is good, and the population has been depressed; and 4) historic strongholds, when the habitat condition has been degraded and the population has been depressed.

Areas with low to moderate habitat potential are described as: 1) adjunct-secure, when habitat condition is good, and the population is strong; 2) adjunct population, when the population is strong, and the habitat condition has been degraded; 3) adjunct habitat, when the habitat condition is good, and the population has been depressed; and 4) adjunct, when the habitat condition has been degraded and the population has been depressed. This series of classifications uses the term adjunct differently than it is typically used to describe areas adjacent to focal or refuge habitats (Frissell, 1993). In this context, adjunct is used to describe areas of lessor habitat potential that are thought to support populations of the species less continuously than areas of higher potential.

Areas that provide subadult/adult rearing, over-wintering, or migratory habitat, are classified as: 1) nodal-high quality, when the habitat condition is high; and 2) nodal-degraded, when the habitat condition has been degraded.

Areas that provide water quality to downstream habitat are called critical contributing areas, and are classified as: 1) critical contributing (CC)-high quality, when these water quality contributing areas contain high quality aquatic conditions; and 2) critical contributing (CC)-degraded, when the aquatic condition in these areas is degraded.

This summary of species status is used for each of the fish species assessed. For bull trout, Map 33b displays this current status. Two watersheds in the subbasin (Upper Johns and Upper Tenmile Creeks) are considered strongholds for bull trout. These watersheds are believed to have the highest densities of bull trout in the subbasin. Upper Crooked River is considered a habitat stronghold, given the high habitat condition. Bull trout abundance in this area is thought to be less than the previous areas, but relatively high in comparison to other parts of the subbasin. Newsome Creek and Red River are considered historic strongholds, due to the habitat condition in these watersheds, and the population levels. While also considered a historic stronghold, American River is believed to have the lowest densities of bull trout in comparison to the other high to very high potential areas in the upper subbasin. The lower parts of the basin, with the exception of Johns Creek, are adjunct habitats for bull trout. The mainstem South Fork Clearwater River provides critical nodal habitat (subadult/adult rearing) that is in a degraded condition, while the nodal habitat in Lower Johns and Lower Tenmile Creeks has high habitat condition.

Findings for Bull Trout

1. Bull trout remain widely distributed throughout the subbasin (Map 33a). Current distribution is considered similar to historic distribution. Both resident and migratory life history forms are present.

2. Bull trout abundance is believed to have declined in the subbasin. The largest decline is believed to have been in the number of large fluvial fish.

3. The South Fork subbasin contains large amounts of habitat that has a high to very high potential to support bull trout (Map 33a), principally in the high elevation (ALTA 1,2 and 5) and mid to upper elevation low relief hills and alluvial valleys (ALTA 6 and 18) in the upper basin (Map 6).

4. The aquatic processes and habitats in most of the high elevation areas remain in high quality condition with little change in disturbance regime. Conversely, the aquatic processes and habitats in the mid to upper elevation low relief hills and alluvial valleys have been altered the most in the subbasin (Maps 15, 28, 30, and 32). These areas contain critical subadult/adult rearing habitat for migrating fish.

5. Harvest of adult bull trout and watershed disruption are key factors responsible for the current status of this species. The threat of these factors has been reduced, although they still represent

some risk to the species. Brook trout interaction and bull trout population isolation and fragmentation are current threats to the species.

6. The viability and long-term sustainability of bull trout in the South Fork subbasin has been reduced due to; the reduction in the number of large fluvial fish, the reduction in habitat condition of the subadult/adult rearing habitat (mainstem river and tributary mainstems) and its consequences on population connectiveness, the presence of brook trout, the possible reduction in the number and size of spawning populations, and the reduction in the habitat quality of spawning and early rearing habitat in the mid to upper elevation low relief hills and alluvial valleys.

Conservation Recommendations for Bull Trout

1. Conserve existing high quality bull trout spawning and rearing habitat and subadult/adult rearing habitats (strongholds and habitat strongholds).
2. Reduce to the extent possible the risks to existing bull trout subpopulations. This includes working cooperatively with IDF&G on brook trout eradication or containment. Upper Crooked River and Mill Creek appear to be two very good areas to prevent brook trout populations from expanding.
3. Restore migratory habitat, focusing on tributary mainstems in the upper basin (historic strongholds) and the South Fork Clearwater River, to improve population resilience and connectiveness.
4. Work cooperatively with IDF&G and BLM to continue to inventory bull trout habitat and populations, and brook trout distribution, threats, and eradication techniques. Establish basin specific criteria to rank population strength and monitor bull trout populations (including numbers and size of migratory fish) over time to be able to describe the change in these populations.
5. Support IDF&G as possible to evaluate the threat of fishing and illegal harvest on bull trout, particularly migratory fish.
6. Restore aquatic processes and habitat condition in high to very high spawning and early rearing bull trout habitat (historic strongholds). Focus on occupied areas or areas adjacent to occupied habitat.

Spring Chinook Salmon

Species Background - General

Status - The following information is summarized from the ICRB Aquatic Component Report. Chinook salmon are distributed widely throughout the Columbia River basin. Spring chinook salmon, which are those currently found in the South Fork Clearwater subbasin, cross Bonneville Dam from March through May. Spring chinook salmon in the Snake River basin are also known as "stream-type" chinook, along with summer chinook, and are more widely distributed than "ocean type" or fall chinook. Stream-type chinook salmon are characterized by juveniles which migrate to the ocean as yearlings, where ocean-type chinook juveniles migrate to the ocean as subyearlings.

Snake River chinook salmon (stream and ocean types) were listed as threatened under the Endangered Species Act in 1992. Spring chinook salmon in the Clearwater River were exempted from the listing because of uncertainty associated with the genetic integrity of this stock. Genetic integrity was questioned because the construction of Lewiston Dam in the early 1900s allegedly eliminated all runs of native spring chinook salmon into the Clearwater basin, and those currently found in the basin are exclusively of hatchery origin.

The distribution and abundance of chinook salmon in the Columbia River have declined substantially from historic levels as a result of passage mortality at dams, habitat degradation, loss of access to historical habitat, overharvest, and interactions with hatchery-reared and non-native fishes. Historic runs of chinook salmon in the Columbia River were immense; estimates of annual run sizes prior to 1850 range from 3.4 to 6.4 million fish (NWPPC, 1986). About 12,452 km of the historical range in the United States and Canada is no longer accessible to chinook salmon. Chinook salmon are extinct in many areas of their historic range including the Upper Klamath, Hood, Klickitat, Umatilla, and Walla Walla River basins and the Metolius River above the Pelton and Round Butte dams. Chinook salmon are extinct in the Entiat River and much of the Yakima River subbasin.

Most chinook salmon stocks in the remaining accessible range are severely depressed and at risk. The depressed state of most salmon stocks is well documented. In the Snake River, an estimated 1,882 naturally-produced stream-type chinook salmon reached Lower Granite Dam in 1994 (NMFS 1995), compared with an estimated production of 1.5 million fish in the late 1880s.

Distribution - Stream-type chinook salmon were historically widely distributed, occupying about 46 percent of the Columbia River basin and occurring nearly everywhere except the Northern Great Basin, Upper Clark Fork, Snake headwaters, and the Upper Snake River above Shoshone Falls. Current distribution has been significantly reduced, and subwatersheds known or predicted to support strong spawning and rearing populations represent 0.2 percent of the historical range and 0.8 percent of the current range.

Wild populations unaltered by hatchery stocks are rare and present in five percent of the historic range and fifteen percent of the existing range of stream-type chinook salmon.

Life History/Habitat Requirements - Life histories of chinook salmon are highly variable, both among and within populations, enabling salmon to adapt to a wide range of physical circumstances (Thorpe 1994). Complex habitats with a high degree of connectivity permit the development and expression of diverse life histories. Spring chinook salmon migrate primarily as age 1+ juveniles. Adult spring chinook salmon destined for the Snake River and tributaries enter the Columbia River in early spring, pass Bonneville Dam and reach the Snake River by late April, arrive at staging areas from late May to early July, and spawn from August to mid-September (IDFG 1992). Adult ages range from three to six, with ages four and five dominating the Grande Ronde and Salmon Rivers, respectively. Fry emerge from February to April, rear through the summer in the natal stream, and then migrate downstream into a mainstem river or large tributary to overwinter, depending on habitat conditions in the natal stream. Smolts pass Lower Granite Dam from late April through June on their seaward migration (Chapman et al. 1991).

Habitat requirements of chinook salmon vary by season and life stage, and the fish occupy a diverse range of habitats. Distribution and abundance of chinook salmon may be influenced by cover type and abundance, water temperature, substrate size and quality, channel morphology, and stream size.

Cover is essential for adult chinook salmon prior to spawning, especially for early migrants which remain in tributaries for several months prior to spawning. Temperature may influence the suitability of spawning habitat. The primary evolutionary factor determining the time of spawning may be the number of temperature units required for successful incubation. Survival and emergence success of chinook salmon embryos is also influenced by fine sediment and flow (Chapman 1988). Other factors that reduce egg-to-fry survival include redd disturbance, bottom scour, and microbial infestation (Beauchamp et al. 1983; Healey 1991).

After emergence, fry concentrate in shallow, slow water near stream margins with cover (Hillman et al. 1989). As fry grow, they occupy deeper pools with submerged cover during the day and shallower inshore habitat at night. Suspended sediment may result in damaged gills, reduced feeding, avoidance of sedimented areas, reduced reactive distance, suppressed production, and increased mortality (Reiser and Bjornn 1979). Fine sediment deposition can also reduce habitat capacity.

Key habitat factors for juvenile rearing include streamflow, pool morphology, cover, and water temperature (Steward and Bjornn 1990). Chinook salmon parr tend to select specific rearing habitats that segregate them, both temporally and spatially, from other native salmonids (Everest and Chapman 1972). They also tend to be most abundant in low gradient, meandering stream channels. Juvenile salmon often occupy different habitats in winter than in simmer with two overwintering strategies, migration and concealment. Juveniles select areas of low water velocity and enter concealment cover beneath cobble or rubble substrate or beneath undercut banks (Hillman et al. 1987).

Key Factors/Threats - Factors believed to contribute to the decline of spring chinook salmon in the Upper Columbia River basin include: (1) habitat degradation; (2) hydropower development; (3) hatcheries; (4) harvest; and (5) predation and competition.

Habitat degradation has influenced the status of chinook salmon. Livestock grazing, road construction, timber harvest, and irrigation diversions have all affected habitat. Reduced stream habitat complexity has been one of the most pervasive cumulative effects of forest management practices and may have altered fish communities (Bisson et al. 1992). Forest management practices, including timber harvest activities, have reduced salmon habitat quantity, reduced habitat complexity, increased sedimentation, and eliminated sources of woody debris needed for healthy salmon habitat. The integrity of salmon ecosystems is linked to the condition of riparian and upland areas and their influence on water temperature, sediment, the aquatic food base, and number and quality of pools.

Construction and operation of mainstem dams on the Columbia and Snake Rivers are considered the major cause of the decline of anadromous fish (CBFWA 1990). Similar to steelhead trout, adult chinook salmon are delayed during upstream migrations and smolts may be killed by turbines or become disoriented or injured, making them more susceptible to predation. They may also be delayed in the large impoundments behind dams. Development and operation of hydropower facilities in the basin have reduced salmon and steelhead production by about eight million fish, including four million from blocked access to habitat above Chief Joseph and Hells Canyon dams, and four million from ongoing passage problems at other facilities (NWPPC 1986).

Hatcheries have been used extensively in attempts to compensate for losses, primarily from hydroelectric projects. Salmon of hatchery origin comprise about 80 percent of the Columbia River salmon run (Lichatowich and Mobrand 1995). Problems associated with hatchery production include genetic introgression from non-native stocks and loss of fitness, reduced wild spawning escapement from the collection of broodstock, ecological interactions between hatchery and wild fish, mixed hatchery and wild stock fisheries, and transmission of diseases (Bevan et al. 1994). Most of the healthy anadromous salmonid stocks identified by Huntington et al. (1994) have either had no fish culture activities in the home watershed or have been exposed to little risk from stock transfers or interactions with hatchery fish.

Harvest of adult or subadult salmon has contributed to the decline of spring chinook salmon in the Columbia River basin since the late 1800s (Fulton 1970). Historical ocean and river harvest rates exceeded 80 percent (Bevan et al. 1994). Thompson (1951) reported that as a result of excessive harvest, by 1919 the characteristics of the Columbia River chinook salmon run had changed. Formerly large portions of the run were reduced, thus making smaller portions of the run more important to the fishery. Declining runs of wild chinook salmon are still harvested in mixed stock commercial and tribal fisheries. Sport harvest of wild chinook salmon has been curtailed in most states.

Predation is one of the major causes of mortality to fry and fingerling chinook salmon (Healey 1991). Introduced species may prey upon and compete with native fishes. Many mid and lower reaches of the Columbia River are dominated by introduced species (Li et al. 1987). Northern squawfish, a native predator, have become well adapted to the habitat created by the dams (Beamesderfer and Rieman 1991). It has been estimated that 15 to 20 million juvenile salmonids in the Snake and lower Columbia Rivers annually succumb to northern squawfish predation (Collis et al. 1995).

Spring Chinook Salmon Specific to the South Fork Clearwater River

Status/Basin Context - Spring chinook salmon in the Snake River are considered an ecologically significant unit (ESU). Spring chinook salmon in the South Fork Clearwater subbasin are not considered part of this ESU, however, because it is believed that the indigenous spring chinook populations were eliminated from the Clearwater River Basin by construction of Lewiston Dam. Spring chinook salmon in the Clearwater basin are therefore not listed as threatened as are other spring chinook in the Snake River basin despite concurrent declines in returning adults. Spring chinook salmon have been considered as a species of special concern by the State of Idaho and as a sensitive species by Region 1 of the U.S. Forest Service since 1987. Spring chinook salmon in the South Fork Clearwater River represent an important population, or metapopulation, in the Clearwater River basin. Others occur in the Lochsa and Selway Rivers and in various smaller tributaries to the lower Clearwater River.

Historic/Inherent Capability - The South Fork Clearwater River has a very high inherent capability to support spring chinook salmon, especially upper basin tributaries such as Red River, American River, Newsome Creek, and Crooked River. This is based on features such as climate, elevation, relief, and geology. Habitat capability is discussed as it relates to: (1) the capability of the basin to support spring chinook spawning and rearing and (2) the subbasin's capability to support juvenile and adult migration.

Historic Spawning and Early Rearing Habitat Potential - Historic spawning and early rearing habitat in the South Fork Clearwater subbasin included the lower reaches of most mainstem tributaries but did not generally extend into smaller tributaries. The unconfined, alluvial, mostly meadow reaches of Crooked River, Red River, and American River provided the most optimal habitat conditions for production of this species (ALTA 18), offering large contiguous areas of appropriately sized spawning gravels as well as preferred low gradient rearing habitat for juveniles (Map 6). Newsome Creek also provided high quality spawning and rearing habitat. Chinook were found in higher gradient tributaries such as Tenmile, Johns, and Mill Creeks (ALTA 3), but at lower numbers. These tributaries do not contain large amounts of unconfined stream channels which provide the highest potential for spring chinook. The mainstem South Fork probably supported spawning and rearing as well. Silver Creek, Wing Creek, and Twentymile Creek did not provide significant habitat because they are largely inaccessible to anadromous fish. Map 34a displays this historic habitat potential.

Current Spawning and Early Rearing Habitat Potential - Areas rated with very high habitat potential for spring chinook include Red River, Crooked River, American River, and the lower reaches of Newsome Creek. Without exception, these areas of very high habitat potential have been degraded by past and current human activities. Areas rated with high habitat potential include the lower reaches of Johns and Tenmile Creeks and the upper reaches of American River. The mainstem channels of Johns and Tenmile are confined streams that do not provide optimum habitat for spring chinook spawning and rearing. However, the habitat condition in these streams is high. Upper American River has low gradeint channels, but of smaller size. The habitat in this area is moderately degraded. Areas with moderate habitat potential include Mill Creek, Meadow Creek, and the upper reaches of Tenmile Creek, Johns Creek, Crooked River, Red River, and Newsome Creek. It is believed that these areas never supported large numbers of spring chinook. The mainstem South Fork currently functions as nodal habitat; it provides adult migration and limited juvenile rearing only.

Current Species Distribution and Abundance - Similar to other salmonids found in the subbasin, spring chinook salmon distribution is probably similar to historic distribution, but abundance is extremely depressed. Spring chinook salmon have been recently documented in Meadow Creek, Mill Creek, Johns Creek, Tenmile Creek, Newsome Creek, Crooked River, American River, and Red River. Abundance of juvenile chinook salmon is correlated with numbers of returning adults and hatchery supplementation, which has been and is widespread across the subbasin.

Population Dynamics and Viability - Assessment of the population dynamics and viability of spring chinook salmon in the South Fork Clearwater subbasin requires consideration of the stock concept, which refers to a group of interbreeding individuals which may have adaptations to local environments and a set of unique characteristics that increases fitness in the local environment (Mayr 1971). This concept was termed "metapopulation" when used in conjunction with the South Fork's two non-anadromous salmonids, westslope cutthroat and bull trout. Historically, it is likely that spring chinook salmon migrating, spawning, and rearing within the South Fork subbasin were a separate stock from those in the North Fork Clearwater, Lochsa, and Selway Rivers and smaller tributaries to the lower Clearwater River. Currently, the lines between these stocks have been blurred due to extensive hatchery supplementation in the South Fork and other areas.

It is widely believed that Lewiston Dam, constructed near the mouth of the Clearwater River in 1927, virtually eliminated all runs of wild chinook salmon in the Clearwater basin until its removal in the 1940s. Harpster Dam, constructed on the South Fork Clearwater River in 1910, may have eliminated or reduced runs of salmon into the South Fork prior to the construction of Lewiston Dam. Both dams have been removed and naturally-spawning runs of chinook salmon have been established through supplementation with hatchery fish. The Clearwater basin has been supplemented with hatchery chinook salmon from various areas, but most prevalent has been the use of Rapid River stock from the Salmon River. Also included are two hatcheries in the South Fork subbasin itself, one located in Red River and the other in Crooked River. Both facilities collect adults and eggs, and rear juveniles for release into these tributaries.

Declines of spring chinook salmon, including those in the South Fork Clearwater River, are well documented. Although not listed, this species in the South Fork is at high risk of extinction. Number of adults seen and/or collected by the two hatcheries has varied widely each year, with 1997 returns significantly higher than recent past returns. Despite relatively large numbers of adults in 1997, an overall decreasing trend has been documented since these facilities were constructed. In many years in the past decade, number of fish and redds has totalled only in the single digits each for Crooked River and Red River.

If the decline of a stock remains unchecked, a threshold is reached at which the probability of extinction from genetic, demographic, or environmental stochasticity increases sharply (Nehlsen et al. 1991). Habitat destruction or over harvest can reduce a population of anadromous fish to a point where extinction from a stochastic event, such as drought or random variation in sex ratio, is virtually inevitable (Soule and Simberloff 1986).

Continued viability of spring chinook salmon in the South Fork subbasin is directly related to the key factors/threats discussed below. Downstream effects probably contribute proportionately more to the risk of extinction than local effects, although all effects contribute cumulatively to a lack of viability.

Subbasin Key Factors/Threats - The key factors and threats identified in the ICRB Science Assessment are applicable to steelhead in the South Fork subbasin, but some involve downstream effects. Although these effects are influencing spring chinook salmon which return to the South Fork, they largely occur outside of the subbasin. Downstream effects include predation and competition by non-native species, harvest, and passage mortality. Other threats more relevant to the South Fork are discussed below.

(1) Habitat Degradation - Principal factors related to habitat degradation in the South Fork Clearwater subbasin are associated with excess fine sediment deposition and extensive stream channel alteration from in-channel placer mining in historic chinook stronghold habitat.

Areas most affected by mining include Crooked River, Newsome Creek, and American River, with Red River and the mainstem South Fork affected to a lesser degree (Map 15). Effects from mining activity are most pronounced in stream reaches with very high potential for chinook production, so not only were streams affected over large areas, these areas were also those with very high inherent capability to provide spawning and rearing habitat for spring chinook salmon.

Areas most affected by fine sediment deposition are those with large amounts of human activity and depositional stream reaches, and include American River, Newsome Creek, and Red River (Figure 3.4). These areas all have very high capability for chinook salmon. Fine sediment increases in the South Fork subbasin have occurred largely from large scale, frequent, or press disturbances such as large scale mining and road construction, activities which have resulted in semi-permanent alterations of stream channel process and changes in the historic sediment regimes in these areas.

(2) Hatcheries - As previously discussed, spring chinook salmon are heavily supplemented with hatchery salmon from a variety of places. Most recently, salmon from Rapid River (Salmon River) have been stocked in South Fork streams, and salmon from each of the two hatcheries located in the subbasin have been stocked annually since their construction. It is not known if naturally-produced salmon have developed local adaptations which are affected by continued use of hatchery fish. Hatcheries have been identified as a major threat to the persistence of wild salmon populations (ICRB Component Report). It could be argued that all salmon within the South Fork subbasin are hatchery salmon, and therefore the continued use of hatchery salmon should pose no threat to their continued existence. Whether use of hatchery supplementation poses a threat to the continued existence of this species or not will no doubt be an issue of continued debate.

<u>Summary of Spring Chinook Habitat and Population Status</u>

To summarize the current status of the habitat and populations of spring chinook, a classification system that considers habitat potential, habitat condition, and species population status is used.

Areas with high to very high habitat potential are described as: 1) strongholds, when habitat condition is good, and the population is strong; 2) population strongholds, when the population is strong, and the habitat condition has been degraded; 3) habitat strongholds, when the habitat condition is good, and the population has been depressed; and 4) historic strongholds, when the habitat condition has been degraded and the population has been depressed.

Areas with low to moderate habitat potential are described as: 1) adjunct-secure, when habitat condition is good, and the population is strong; 2) adjunct population, when the population is strong, and the habitat condition has been degraded; 3) adjunct habitat, when the habitat condition is good, and the population has been depressed; and 4) adjunct, when the habitat condition has been degraded and the population has been depressed. This series of classifications uses the term adjunct differently than it is typically used to describe areas adjacent to focal or refuge habitats (Frissell, 1993). In this context, adjunct is used to describe areas of lessor habitat potential that are thought to support populations of the species less continuously than areas of higher potential.

Areas that provide subadult/adult rearing, over-wintering, or migratory habitat, are classified as: 1) nodal-high quality, when the habitat condition is high; and 2) nodal-degraded, when the habitat condition has been degraded.

Areas that provide water quality to downstream habitat are called critical contributing areas, and are classified as: 1) critical contributing (CC)-high quality, when these water quality contributing areas contain high quality aquatic conditions; and 2) critical contributing (CC)-degraded, when the aquatic condition in these areas is degraded.

This summary of species status is used for each of the fish species assessed. For spring chinook, Map 34b displays this current status. There are currently no strongholds for spring chinook in the subbasin. Two watersheds in the subbasin (lower Johns and lower Tenmile Creeks) are considered habitat strongholds. American River, Crooked River, Red River and Newsome Creek are considered historic strongholds. These areas have the highest historic potential, along with the highest current habitat potential and densities of spring chinook. Most of the lower parts of the basin, including Meadow, Mill, Cougar and Peasley Creeks are considered adjunct habitat for spring chinook. Silver, Wing, and Twentymile Creeks are considered critical contributing areas in high habitat condition. The mainstem South Fork Clearwater River provides critical nodal habitat that is in a degraded condition.

Spring Chinook Salmon Findings -

1. Spring chinook salmon are distributed across the South Fork subbasin, but are found in highest numbers in mainstem Crooked River, Red River, American River, and Newsome Creek. Juvenile abundance varies by year and is correlated with numbers of returning adults and the amount of hatchery supplementation.

2. Abundance of spring chinook salmon has declined over the past seven decades or more through combination of downstream effects and habitat degradation locally.

3. The South Fork Clearwater subbasin has significant amounts of habitat with very high potential for this species. These areas are located primarily in Red River, Crooked River, American River, and Newsome Creek. These areas have also been moderately to severely degraded by past and current human activities such as mining and road construction.

4. There are no current strongholds for wild or naturally reproducing spring chinook salmon in the South Fork Clearwater subbasin. Existing populations are maintained tenuously through the use of hatchery supplementation, which may also be putting the population at risk. In the absence of hatchery supplementation, given downstream effects, spring chinook salmon in the subbasin may become extinct over the next one or two generations.

5. Downstream effects probably contribute most to the risk of extinction for this species, but habitat degradation in this subbasin contributes cumulatively to this risk.

Conservation Recommendations for Spring Chinook Salmon -

1. Restore degraded habitat in Red River, American River, Crooked River, and Newsome Creek. Restoration should focus on restoring, to the extent possible, the hydrologic process and sediment regime.
2. Work cooperatively with IDFG and the Nez Perce Tribe in the judicious and cognizant use of hatchery supplementation to increase number of returning adults to this subbasin.
3. Conserve existing habitat in lower Tenmile and Johns Creek. While this habitat does not have the same very high potential as the areas in the upper basin, it currently provides habitat in a high condition. These areas are refugia, but should only be counted on temporarily while the habitat in the upper subbasin are restored.

Steelhead/Rainbow (Redband) Trout

Species Background - General

Status - The following information is summarized from the ICBEMP Aquatic Component Report (ICRB Component Report) . Steelhead trout, the anadromous form of rainbow/redband trout, are distributed within the Upper Columbia River Basin as two genetically distinct subspecies, coastal and inland. Each subspecies has two major forms, winter and summer, although coastal steelhead are predominately winter-run and inland steelhead summer-run. Winter fish enter freshwater three to four months prior to spawning, and summer run steelhead enter freshwater nine to ten months prior to spawning. Summer run steelhead are described as either "A" run or "B" run, based on the time of passage over Bonneville Dam.

Rainbow trout, or redband trout, is the non-anadromous form of this species. Non-anadromous rainbow trout in the Upper Columbia River basin have been further divided into two groups, one group which evolved in sympatry with steelhead and the other allopatric with steelhead, or those which evolved outside the historical range of steelhead. Sympatric rainbow/redband trout are considered the non-anadromous form historically derived or associated with steelhead and have been termed "residuals". Both anadromous and non-anadromous forms exist in sympatry in most populations, and morphologically juveniles of both forms are indistinguishable.

The distribution and abundance of steelhead trout have declined from historical levels as a result of passage mortality at dams and obstructions, habitat degradation, loss of access to historical habitat, over harvest, and interactions with hatchery-reared and non-native fishes. Numerous state, federal, and provincial management agencies list steelhead as a species of special concern. Concern for the persistence of steelhead stocks culminated in 1994 petitions to the National Marine Fisheries Service for review of the species status under the Endangered Species Act. Columbia and Snake River steelhead trout of wild or natural origin were subsequently listed as a threatened species in September 1997.

Distribution - The historical range of steelhead was the eastern Pacific Ocean and freshwaters west of the Rocky Mountains, extending from northwest Mexico to the Alaska peninsula (Scott and Crossman 1973). In the Columbia River basin, steelhead trout were present in most streams, both perennial and intermittent, that were accessible to anadromous fish including all accessible tributaries to the Snake River downstream from Shoshone Falls (Parkhurst 1950). Steelhead formerly ascended the Snake River and spawned in reaches of Salmon Falls Creek, Nevada, more than 1,450 km from the ocean. About 16,935 km of stream were accessible to steelhead in the Columbia River basin, including Canada. Steelhead occupied about 50 percent of the subwatersheds in ICRB assessment area, including all ecological units except the Northern Great Basin, Upper Clark Fork, Upper Snake, and Snake Headwaters. Historical runs of steelhead trout were large, providing a significant portion of the commercial catch in the late 1800s.

Steelhead trout are currently the most widely distributed anadromous salmonid in the ICRB assessment area, although they are extinct in large portions of their historical range. The current known distribution includes 46 percent of their historical range. About 12,452 km of historical range is no longer accessible in the Columbia River basin in the United States and Canada. (NWPPC 1986).

Despite their relatively broad distribution, very few healthy steelhead populations exist (ICRB Component Report). Recent status evaluations suggest many steelhead stocks are depressed. A recent multi-agency review shows that total escapement of salmon and steelhead to the various Columbia River regions has been in decline since 1986 (Anderson et al. 1996). Existing steelhead stocks consist of four main types: wild, natural (non-indigenous progeny spawning naturally), hatchery, and mixes of natural and hatchery fish. Production of wild anadromous fish in the Columbia River basin has declined about 95 percent from historical levels (Huntington et al. 1994). Most existing steelhead production is supported by hatchery and natural fish as a result of large-scale hatchery mitigation production programs. Wild, indigenous fish, unaltered by hatchery stocks, are rare and present in only 10 percent of the historical range and 25 percent of the existing range. Remaining wild stocks are concentrated in the Salmon and Selway (Clearwater basin) Rivers in central Idaho and the John Day River in Oregon. Although few wild stocks were classified as strong, the only subwatersheds classified as strong were those sustaining wild stocks.

Life History/Habitat Requirements - Steelhead trout are the anadromous form of rainbow trout, migrating to the ocean and back to natal streams for spawning and early rearing. Within the anadromous life history strategy, considerable divergence exists both among and within populations concerning migration, early rearing, and ocean rearing timing, which allows steelhead to adapt to a wider range of physical circumstances (Throb 1994). Mature adult summer-run steelhead ascend the Columbia River from May through October, and winter-run fish from November through April (Fulton 1970). Most steelhead remain in salt water for one to four years, with both age and length at maturity at least partially dependent on length of ocean residence (Withler 1964; Mallett 1974). Fecundity is positively related to fish length and may be genetically and environmentally influenced (Mullan et al. 1992). Sex ratios are usually about 1:1, but male residualism may affect it (Mullan et al. 1992).

Both summer and winter steelhead spawn from March to June, typically on a rising hydrograph and prior to peak streamflow (Thurow 1987). A dominant male usually pairs with a female, although several other males, most notably precocial small males ($\leq$200 mm), may fertilize eggs. Spawning of precocial males may be particularly important when adult escapements are low.

Incubation and emergence are temperature dependent and variable (Thurow 1987). Emergence is generally complete by mid-July even in the highest elevation streams. Parr rear in fresh water for varying periods ranging from two to three or more years depending on water temperature and growth rates (Mullan et al. 1992). Immediately prior to migration to the ocean, parr imprint on their natal streams. The parr-smolt transformation typically occurs from April to mid-June and is associated with developmental changes in osmotic and ionic regulatory mechanisms. The smolting process is influenced by photoperiod and is a function of fish size (Hoar 1976). When confined above barriers or in cold systems where growth is slow, steelhead may residualize to a non-anadromous form (Mullan et al. 1992).

Steelhead inhabit a wide range of diverse habitats, rearing, overwintering, and migrating through streams ranging from steep, low-order tributaries up to mainstem rivers. Habitat requirements of steelhead vary by season and life stage (Bjornn and Reiser 1991). Steelhead distribution and abundance may be influenced by water temperature, stream size, flow, channel morphology, riparian vegetation, cover type and abundance, and substrate size and quality (Everest 1973; Li et al. 1994; Reiser and Bjornn 1979).

Life stages are closely linked to habitat characteristics. Steelhead spawn in sorted gravels in both mainstem rivers and tributaries. Incubation success is influenced by fine sediment, temperature, and flow (Chapman 1988). After emergence, fry typically move into shallow and low velocity channel margins (Everest and Chapman 1972). As fish become larger, preferred habitats change and fry use areas with deeper water, a wider range of velocities, and larger substrate. Focal point velocity, distance from the substrate, and maximum velocity are all correlated significantly with fish size (Everest and Chapman 1972).

Juvenile steelhead typically occupy different habitats in winter than in summer (Bustard and Narver 1975). Steelhead may adopt two overwintering strategies, migration and concealment. Juveniles typically select areas of low water velocity and enter concealment cover beneath cobble or rubble substrate (Edmundson et al. 1968; Everest and Chapman 1972).

Like other anadromous fish, the status and distribution of steelhead are confounded by a large number of factors operating at multiple scales in both space and time. Ocean and passage conditions, harvest, and the use of hatchery fish have undoubtedly played a major role in the condition of the remaining populations. Sorting out the role of habitat change and land management effects of the decline of this species will likely result only through specific analysis capable of finer resolution and control of confounding effects.

Key Factors/Threats - Six factors believed to contribute to the decline of this species in the Upper Columbia River basin include: (1) predation and competition; (2) blocked access to historical habitat; (3) passage mortality; (4) habitat degradation; (5) hatcheries; and (6) harvest (ICRB Component Report).

Impacts related to predation and competition are associated with the 55+ introduced species which occur within the current range of steelhead. Because introduced species did not co-evolve with steelhead, there has been no opportunity for adaptation to ameliorate competition (Fausch 1988) or predation. Hobbs and Huenneke (1992) suggest that non-natives may pose a greater risk to native species where habitat has been disturbed. Dams in particular have created habitat that is suitable for a variety of non-native predators and potential competitors. Native predators such as northern squawfish may also be influenced by anthropogenic habitat alterations.

An estimated 12,452 km of steelhead habitat are no longer accessible to anadromous fish in the Columbia River basin in the United States and Canada (NWPPC 1986). Although undocumented, the historical range likely supported diverse and locally adapted populations. Extinctions have resulted in lower diversity and lower total abundance of steelhead. Cumulative habitat changes that eliminate or isolate segments of populations may increase both demographic and environmental stochasticity, thereby increasing the risk of extirpation or extinction of remaining populations.

Construction and maintenance of mainstem dams on the Snake and Columbia Rivers are considered the major cause of decline of anadromous fish. Hydroelectric development changed Columbia and Snake river migration routes from mostly free-flowing in 1938 to a series of dams and impoundments by 1975. Reservoirs reduce flows in most years by about 50 percent during smolt migration (Raymond 1979). Steelhead must navigate up to nine mainstem dams. At each dam, adult steelhead are delayed during upstream migrations. Smolts migrating downstream may be killed by turbines, become disoriented or injured, making them more vulnerable to predation, or become delayed in the large impoundments behind dams (IDFG 1990).

More than 95 percent of healthy anadromous stocks were judged by biologists to be threatened by some degree of habitat degradation. Fish habitat quality in most watersheds has declined. During the past 50 years, numbers of pools have decreased and fine sediment has increased in selected Northwest watersheds (McIntosh et al. 1994a).

Hatcheries have been widely used in attempts to mitigate losses of steelhead caused by construction and operation of dams. Hatcheries may affect wild steelhead populations through genetic introgression and loss of fitness, creation of mixed stock fisheries related to harvest, competition for food and space, and changes in the abundance of disease organisms (Reisenbichler 1977). Studies of the interaction between wild and hatchery fish illustrate that survival of progeny from hatchery or hatchery/wild hybrid parentage is less than that for progeny of wild fish pairings (Chilcote et al. 1986). Byrne et al. (1992) suggested that supplementation of native stocks with hatchery stocks have typically resulted in replacement, not enhancement, of native steelhead. Introductions of large numbers of hatchery-reared parr may also cause localized decreases in the density of wild juvenile steelhead (Pollard and Bjornn 1973).

Steelhead stocks have historically provided harvest opportunities for tribal, commercial, and sport fisheries. Wild steelhead populations have declined as numbers of hatchery steelhead have increased, creating harvest management problems. Hatchery steelhead that are surplus to egg-taking needs can be harvested, in contrast to declining runs of wild steelhead that cannot. Although harvest of wild stocks has been reduced, declining runs of wild steelhead are still harvested in tribal fisheries, and steelhead are killed during commercial salmon fisheries in the Columbia River and coastal marine waters, and in high seas driftnet fisheries (Chapman et al. 1994b.)

Steelhead Trout Specific to the South Fork Clearwater River Subbasin

Status/Basin Context - Steelhead trout in the South Fork Clearwater subbasin are part of the Snake River ESU of west coast steelhead and as such are currently listed as threatened under the Endangered Species Act (ESA) by the National Marine Fisheries Service (NMFS). Steelhead trout have also been considered a species of special concern by the State of Idaho and a sensitive species by Region 1 of the U.S. Forest Service since 1987. Steelhead trout in the South Fork Clearwater River represent an important metapopulation in the Clearwater River basin. Others occur in the Lochsa and Selway Rivers and in various smaller tributaries to the lower Clearwater River.

Historic/Inherent Capability - The South Fork Clearwater River has a very high inherent capability to support steelhead trout. This is based on general features such as climate, elevation, relief, and geology. Habitat capability is discussed as it relates to: (1) the capability of the basin to support steelhead trout spawning and rearing; and (2) the subbasin's capability to support migration.

Historic Spawning and Early Rearing Habitat Potential - Historic steelhead spawning and early rearing habitat in the South Fork Clearwater subbasin included the lower reaches of mainstem tributaries and their accessible higher order tributaries. The canyon reaches of tributaries such as Johns Creek, Newsome Creek, Tenmile Creek, and Crooked River provided the most optimal spawning and rearing habitat for this species (ALTA 3). American and Red Rivers, along with lower Meadow and Mill Creeks provided habitat with high potential, although somewhat less than the previously listed areas. The upper reaches of Meadow Creek, Mill Creek, Newsome Creek, Crooked River, Red River, and American River provide moderate habitat potential. The mainstem South Fork Clearwater River provided additional rearing habitat, especially in the winter. The mainstem South Fork also provided spawning habitat, although this habitat was probably not widespread nor randomly distributed and occurred in specific lower gradient reaches, like near the mouth of Johns Creek and near the mouth of Newsome Creek and Crooked River. Silver Creek, Wing Creek, and Twentymile Creek did not provide habitat because they were and are largely inaccessible. This habitat potential is displayed on Map 35a.

Current Spawning and Early Rearing Habitat Potential - The areas described above with high historic capability are generally those areas currently used for spawning and rearing. The lower reaches of Crooked River, Newsome Creek, Johns Creek, and Tenmile Creek currently provide very high habitat capability for this species. Johns Creek and Tenmile Creek have high quality habitat. Crooked River and Newsome Creek have been degraded by human activities such as placer mining and road construction. Limited spawning still occurs in the mainstem South Fork in the areas described above. Mill Creek, Meadow Creek, Red River, and American River, areas with moderate to high habitat potential, have been moderately to severely degraded.

Current Species Distribution and Abundance - Steelhead trout are prevalent throughout many areas in the South Fork Clearwater subbasin. Map 35a displays the current distribution of steelhead trout. Abundance of steelhead trout is correlated with numbers of returning adults and additional hatchery supplementation, which has occurred annually in Crooked River, Newsome Creek, American River, and Red River.

Population Dynamics and Viability - Assessment of the population dynamics and viability of steelhead trout in the South Fork Clearwater subbasin requires consideration of the stock concept, which refers to a group of interbreeding individuals which may have adaptations to local environments and a set of unique characteristics that increases fitness in the local environment (Mayr 1971). This concept was termed "metapopulation" when used in conjunction with the South Fork's two non-anadromous salmonids, westslope cutthroat and bull trout. Historically, it is likely that steelhead trout migrating, spawning, and rearing within the South Fork subbasin were a separate stock from those in the North Fork Clearwater, Lochsa, and Selway Rivers and smaller tributaries to the lower Clearwater River. Currently, the lines between these stocks have been blurred due to extensive hatchery supplementation in the South Fork and other areas. Stocked fish in the South Fork have mainly included pre-smolts from Dworshak National Fish Hatchery, which is a mitigation hatchery constructed concurrent with Dworshak Dam to mitigate the loss of anadromous fish from the North Fork Clearwater River. Wild/natural adult steelhead trout returning to the South Fork Clearwater River are probably comprised of a genetic mix between the historic wild stock present prior to hatchery supplementation and North Fork Clearwater stocks.

Adults returning to the South Fork Clearwater River, whether wild/natural or hatchery, are considered "B-run" steelhead, which refers to the time of passage over Bonneville Dam; passage occurs later than for steelhead considered "A-run". Declines of wild/natural adult steelhead to the Clearwater River, including the South Fork Clearwater River, are well documented and have culminated with the species listed as threatened in 1997. Its status as a threatened species is based on a moderate risk of extinction, which could change to high risk if declines continue unchecked. If the decline of a stock remains unchecked, a threshold is reached at which the probability of extinction from genetic, demographic, or environmental stochasticity increases sharply (Nehlsen et al. 1991). Habitat destruction or over harvest can reduce a population of anadromous fish to a point where extinction from a stochastic event, such as drought or random variation in sex ratio, is virtually inevitable (Soule and Simberloff 1986).

Continued viability of steelhead trout in the South Fork subbasin is directly related to the key factors/threats discussed below.

Subbasin Key Factors/Threats - The key factors and threats to steelhead trout identified in the ICBEMP Component Report are applicable to steelhead in the South Fork subbasin, but some involve downstream effects. Although these effects are influencing steelhead which return to the South Fork, they largely occur outside of the subbasin. Downstream effects include predation and competition by non-native species, blocked access to historical habitat, and passage mortality. The other three threats, which include habitat degradation, harvest, and hatcheries, occur within the South Fork and are discussed in more detail below,

(1) Habitat Degradation -Principal factors related to habitat degradation in the South Fork Clearwater subbasin are associated with excess fine sediment deposition and extensive stream channel alteration from in-channel placer mining in historic steelhead habitat.

Areas most affected by mining include Crooked River, Newsome Creek, and American River, with Red River and the mainstem South Fork affected to a lesser degree (Map 15). Effects from mining activity are most pronounced in stream reaches with a high to very high potential for steelhead production, so not only were streams affected over large areas, these areas were also those with very high inherent capability to provide spawning and rearing habitat for steelhead trout. The exception to this is Johns and Tenmile Creeks which have a very high potential for steelhead, and have not been significantly degraded from mining activities.

Areas most affected by alteration of the sediment regime include American River, Newsome Creek, Red River, Mill Creek, and Meadow Creek. Of these, Newsome Creek has a very high habitat potential for steelhead. Fine sediment deposition in the South Fork has occurred largely from press disturbances such as large scale mining and road construction, activities which have resulted in permanent features on the landscape such as glory holes and high road densities. These features have altered the sediment regime (figure 3.4), increased the base sediment yield over historic levels.

(2) Harvest - Legal harvest of both juvenile and adult steelhead trout in the South Fork subbasin is permitted under current IDFG fishing regulations, although only harvest of hatchery adult steelhead is permitted. The overall effect of this harvest on the population of wild steelhead is unknown, although creel census data collected between 1990-1995 from streams such as Crooked River suggest that harvest of juvenile steelhead may be significant. IDFG reduced legal harvest of trout in Crooked River in 1995 to two fish per day, replacing the six per day permissible prior to the change. The number of wild steelhead trout harvested illegally is unknown, but a percentage are likely taken each year.

(3) Hatcheries - As previously discussed, some streams in the South Fork subbasin have been annually stocked with hatchery steelhead pre-smolts, mostly from Dworshak National Fish Hatchery on the lower Clearwater River. The genetic integrity of steelhead trout in the South Fork subbasin has probably been changed from the historic condition of the stock. Both the total effect of these changes and consideration of this activity as a threat to the continued persistence of the stock are unknown. It is possible that the stock would be currently extinct in the absence of hatchery supplementation, given the presence of historic dams on the South Fork and mainstem Clearwater River. Continued supplementation poses both a risk to development of a locally adapted population, and a benefit to the stock through increased population size.

Summary of Steelhead Habitat and Population Status

To summarize the current status of the habitat and populations of steelhead, a classification system that considers habitat potential, habitat condition, and species population status is used.

Areas with high to very high habitat potential are described as: 1) strongholds, when habitat condition is good, and the population is strong; 2) population strongholds, when the population is strong, and the habitat condition has been degraded; 3) habitat strongholds, when the habitat condition is good, and the population has been depressed; and 4) historic strongholds, when the habitat condition has been degraded and the population has been depressed.

Areas with low to moderate habitat potential are described as: 1) adjunct-secure, when habitat condition is good, and the population is strong; 2) adjunct population, when the population is strong, and the habitat condition has been degraded; 3) adjunct habitat, when the habitat condition is good, and the population has been depressed; and 4) adjunct, when the habitat condition has been degraded and the population has been depressed. This series of classifications uses the term adjunct differently than it is typically used to describe areas adjacent to focal or refuge habitats (Frissell, 1993). In this context, adjunct is used to describe areas of lessor habitat potential that are thought to support populations of the species less continuously than areas of higher potential.

Areas that provide subadult/adult rearing, over-wintering, or migratory habitat, are classified as: 1) nodal-high quality, when the habitat condition is high; and 2) nodal-degraded, when the habitat condition has been degraded.

Areas that provide water quality to downstream habitat are called critical contributing areas, and are classified as: 1) critical contributing (CC)-high quality, when these water quality contributing areas contain high quality aquatic conditions; and 2) critical contributing (CC)-degraded, when the aquatic condition in these areas is degraded.

This summary of species status is used for each of the fish species assessed. For steelhead, Map 35b displays this current status. Two watersheds in the subbasin (lower Johns and lower Tenmile Creeks) are considered current strongholds for steelhead. The upper portions of these two watersheds are considered habitat strongholds. Mill Creek is considered a population stronghold due to the high densities of steelhead in this watershed. American River, Crooked River, Red River, Newsome Creek, Meadow Creek, and the South Fork Mainstem River are considered historic strongholds. Silver, Wing, and Twentymile Creeks are considered critical contributing areas in high habitat condition.

Steelhead Trout Findings -

1. Steelhead trout are widely distributed across the South Fork Clearwater subbasin (Map 35a). Abundance varies by year and stream, and is partly correlated with numbers of returning adults. Other factors affecting abundance include habitat quality, hatchery supplementation , and fishing pressure.

2. Steelhead trout abundance has declined over the past seven decades through a combination of downstream and local effects.

3. The South Fork Clearwater subbasin has a large amount of habitat that has high to very high capability to support steelhead trout spawning and rearing, especially in the canyon reaches of Johns Creek, Tenmile Creek, Newsome Creek, and Crooked River. A large amount of habitat with high habitat capability exist in Red River and American River (see Map 35a).

4. The mainstem South Fork Clearwater River historically and currently supports spawning near Johns Creek and Newsome Creek and rearing throughout its length, depending on time of year.

5. Current steelhead trout strongholds are located in Tenmile and Johns Creeks. Potential strongholds, or areas with the highest habitat potential in addition to Johns and Tenmile Creeks, include Crooked River and Newsome Creek.

6. Downstream effects probably contribute most to the risk of extinction for this species, but habitat degradation in this subbasin contributes cumulatively to this risk.

Conservation Recommendations for Steelhead Trout

1. Conserve existing steelhead trout strongholds, which include Johns and Tenmile Creeks.
2. Restore historic stronghold areas with very high habitat capability, which include Crooked River and Newsome Creek at the fastest possible rate. Additionally, restore historic strongholds with a high habitat potential, including Red River, American River, Mill Creek, Meadow Creek, and the conditions in the mainstem South Fork River.
3. To accomplish the restoration of the mainstem river conditions, all watersheds in the subbasin should be considered. Conserve the existing water quality from the critical contributing areas, while reducing the effects from degraded watersheds through restoration efforts.
4. Work cooperatively with IDFG to better understand the current spawning and rearing in the mainstem South Fork Clearwater River.

Westslope Cutthroat Trout

Species Background - General

***Status* -** The following information was principally summarized from the ICBEMP Aquatic Component Report (ICRB Component Report). Westslope cutthroat trout were once abundant through much of the north and central portions of the Upper Columbia River basin. Although this subspecies is still widely distributed, remaining populations may be seriously compromised by habitat loss and genetic introgression through hybridization (McIntyre and Rieman 1995; Rieman and Apperson 1989). Westslope cutthroat trout were listed in the U.S. Fish and Wildlife Service "Red Book" of endangered and threatened species from 1966 to 1972. The subspecies was subsequently dropped from the list due to confusion over its classification (Roscoe 1974). Westslope cutthroat trout are presently considered a sensitive or vulnerable species by management agencies, including Region 1 of the U.S. Forest Service, in Idaho, Washington, Oregon, and Montana.

***Distribution* -** Historically, westslope cutthroat trout were the dominant salmonid in streams of central and northern Idaho (Behnke and Wallace 1986). Isolation of cutthroat trout in drainages of the Upper Columbia River basin led to the evolution of this subspecies (Behnke 1992). Behnke (1992) and others believe that this group spread from the Columbia to the Clearwater River, Salmon River, and drainages east of the Continental Divide by headwater capture during periods of glaciation. The presence of westslope cutthroat trout above many barrier falls suggests that they preceded the advent of rainbow trout and chinook salmon throughout the Columbia River basin (Behnke 1979).

This subspecies probably evolved in sympatry with bull trout, mountain whitefish, northern squawfish, and several species of cyprinids and sculpin (Rieman and Apperson 1989). They coexist naturally with rainbow trout (steelhead) and chinook salmon only in the Salmon and Clearwater Rivers. Where habitat remains in relatively good condition, westslope cutthroat trout are often found in most streams accessible to them (Rieman and Apperson 1989; Rieman and McIntyre 1993). The estimated historical range for this subspecies represented about 35 percent of the Upper Columbia River basin (ICRB Component Report).

Westslope cutthroat trout presently remain widely distributed within their historical range, and some extension of the natural distribution has also occurred through hatchery introductions (ICRB Component Report). Despite wide distribution, there appear to be few remaining healthy populations outside of the central Idaho mountains. Rieman and Apperson (1989) estimated that strong westslope populations exist in only 11 percent of the historical range in Idaho, and populations that were both numerically strong and genetically pure existed in only 4 percent of the historical range.

***Life History/Habitat Requirements* -** Three life history strategies of westslope cutthroat trout are known to occur which include adfluvial, fluvial, and resident (Liknes and Graham 1988). Those most common in central Idaho include fluvial and resident forms, with fluvial fish comprising the only migratory populations in larger river systems. These divergent life history strategies are viewed as alternative strategies that contribute to the persistence of populations in variable environments.

Summer is a time of little movement for westslope cutthroat trout; fish establish summer feeding stations which tend to define the primary behavioral pattern for that time period (Liknes and Graham 1988). Migrations of considerable magnitude occur at other times, which include spawning migrations in the spring, downstream movements from tributary streams to overwinter, or simply migrations to other portions of rivers, which may be related to food availability (Liknes and Graham 1988). Fluvial and resident westslope cutthroat trout in small streams may enter crevices in the substrate when water temperatures drop to 4-5° C. Migrations of cutthroat trout out of small tributary streams may occur in the fall in the absence of suitable winter rearing habitat.

Spawning for this subspecies occurs in the spring, with initiation of spawning behavior strongly correlated with water temperature. Spawning generally occurs in small tributaries, and migratory forms may spawn in the lower reaches of the same streams used by resident fish (McIntyre and Rieman 1995). Alternate-year spawning has been reported in the Flathead River basin in Montana (Shepard et al. 1984), with repeat spawners composing from 0.7 to 24 percent of the adult population.

Waters inhabited by westslope cutthroat trout generally are cold and nutrient-poor (Liknes and Graham 1988). This subspecies appears to be particularly well suited to a relatively cold and sterile environment. Although cutthroat trout may be found throughout large river basins, spawning and rearing occurs mostly in headwater streams (Platts 1979; Rieman and Apperson 1989; Mulan et al. 1992). Spawning habitat has been characterized as gravel substrates with particle sizes ranging from 17 to 20 cm, and mean velocities between 0.3 and 0.4 meters/second (Shepard et al. 1984).

Substrate composition is believed to strongly influence survival of eggs and fry as well as the amount and quality of winter rearing habitat. Although it is known that larger fish congregate in pools in the winter (Peters 1988), highly embedded substrates may also be particularly harmful for juvenile cutthroat trout that typically enter the substrate in the winter (McIntyre and Rieman 1995). Although some populations persist despite abundant sediment (Magee 1993), increases of fine sediment in substrates should be viewed as an increased risk for any population. Cutthroat trout microhabitats are associated with water velocities ranging from 0.1 to 0.3 m/sec (Griffith 1970; Pratt 1984a). Trout less than 100 mm in length are found predominantly in pools and runs, where the distribution and abundance of larger fish has been strongly associated with pools (Shepard 1983; Pratt 1984a), and in general stream reaches with numerous pools support the highest densities of fish. It is not entirely clear, however, how strongly variability among local habitats influences the characteristics and dynamics of westslope cutthroat trout populations (McIntyre and Rieman 1995).

***Key Factors/Threats* -** Three factors believed to contribute most to the decline of this subspecies include: (1) introduced species; (2) angling, and; (3) habitat disruption (ICRB Component Report).

Impacts related to introduced species include genetic introgression, specifically with rainbow and yellowstone cutthroat trout, and competition, primarily with non-native brook trout. Cutthroat and rainbow trout remained reproductively distinct where they evolved in sympatry (Behnke 1992), but where non-native rainbow trout were introduced, hybridization is widespread (Behnke and Zarn 1976; Rieman and Apperson 1989). Hybridization between yellowstone and westslope cutthroat trout is also widespread where this species was introduced; yellowstone cutthroat trout have been introduced widely into the range of westslope cutthroat trout (Liknes 1984; Rieman and Apperson 1989).

Brook trout have also been introduced into many streams in the Upper Columbia River basin and are believed to have replaced many westslope cutthroat trout populations, particularly in headwater streams (Behnke 1992). Where the two species co-exist, westslope cutthroat trout predominate in higher gradient reaches with brook trout prevailing in lower gradient reaches (Griffith 1988).

Angling is a second factor related to the status of westslope cutthroat trout. This subspecies is highly susceptible to angling (Behnke 1992), and many populations have increased in response to harvest restrictions. Rieman and Apperson (1989) found evidence that fishing mortality increased with decline in population size and speculated that harvest could lead to the elimination of some small populations. Angler harvest may also have also have led to serious declines or complete elimination of the fluvial component of some river systems. Restrictive harvest regulations may be required to maintain most westslope cutthroat trout populations (Rieman and Apperson 1989).

Habitat disruption is the third factor consistently identified as a contributor to the decline of this subspecies. Loss of habitat connectivity as well as reduced habitat quality have contributed to the decline or elimination of many populations. Fragmentation of habitats results in isolation of local populations, thereby increasing the risk of extinction due to genetic and stochastic risks (McIntyre and Rieman 1995). Overall decline in abundance and quality of habitat, whether connectivity exists or not, may result in a higher deterministic risks of extinction, which would occur as a result of cumulative effects that result in mortality which cannot be compensated by increased survival.

Westslope Cutthroat Trout Specific to the South Fork Clearwater River Basin

Status/Basin Context - Westslope cutthroat trout in the South Fork Clearwater River represent an important metapopulation in the Clearwater River basin. Other important metapopulations include the Selway, Lochsa, and North Fork Clearwater populations, as well as smaller populations in tributaries to the lower Clearwater River. Westslope cutthroat trout are listed as a sensitive species in Region 1, USFS, and are a species of special concern in the State of Idaho. They are presently not listed or proposed for listing under the Endangered Species Act (January 1998).

Historic/Inherent Habitat Capability - The South Fork Clearwater basin has a high inherent capability to support westslope cutthroat trout. This is based on general features such as climate, elevation, relief, and geology. Habitat capability is discussed as it relates to : (1) the habitat capability of the basin to support cutthroat trout spawning and rearing (juvenile rearing for migratory fish); (2) the subbasin's capability to support migration and late rearing of fluvial fish, and; (3) the subbasin's capability to support a metapopulation, or connection of local populations, of westslope cutthroat trout.

Historically, distribution of westslope cutthroat trout in the South Fork was probably similar to existing distribution. Rieman and Apperson (1989) reported where cutthroat trout and steelhead/rainbow trout coexist naturally, the two species exhibit strong segregation. In streams where both species occur, Hansen (1977) found that cutthroat trout were restricted to headwater reaches while rainbow trout used the lower reaches and suggested that a form of interactive segregation isolated the two species. Conversely, Griffith (1988) believed that selective segregation is more important, observing that westslope cutthroat trout did not replace steelhead trout when the latter declined and disappeared following construction of Dworshak Dam. Goodnight and Mauser (1980) reported an increase in the proportion of cutthroat to rainbow trout following the elimination of steelhead trout in the Little North Fork Clearwater River, but did not note an overall increase in cutthroat numbers. The lack of increase in cutthroat trout with a decline in native rainbow trout supports the idea of selective segregation and limited competition (Griffith 1988). It is possible that the proportionately greater fecundity of anadromous steelhead results in westslope cutthroat trout restricted to areas inaccessible or undesirable to steelhead. As discussed above, westslope cutthroat trout probably preceded the advent of anadromous fish in terms of evolution but co-evolved with bull trout. The advent of anadromous fish may subsequently have pushed cutthroat trout to the upper reaches of tributary streams because of niche overlap.

In addition, Rieman and Apperson (1989) reported that most of the remaining strong westslope populations in Idaho are contained within undeveloped (roadless and wilderness) areas. The ICRB Component Report suggested that the association of this subspecies with roadless and wilderness areas indicates a strong vulnerability to habitat disruption. Cutthroat trout strongholds in the South Fork subbasin are also associated with roadless/wilderness areas, and it is thus possible that either habitat modification or some other factor influenced by roads and human access, such as angler mortality, may be a determinant of cutthroat trout presence/absence and population strength.

Current Spawning and Rearing - Currently in the South Fork Clearwater subbasin, westslope cutthroat trout exist primarily as subpopulations in the upper reaches of streams and their tributaries such as Mill Creek, Johns Creek, Tenmile Creek, Crooked River, Red River, American River, and Newsome Creek. Additional populations are located in tributaries such as Wing and Twentymile Creeks which are too small or have poor accessibility for anadromous fish. Map 36a displays current known distribution of westslope cutthroat trout in the subbasin. This distribution is based on agency or tribal inventories using accepted scientific procedures. Cutthroat trout are widely distributed across the basin, but population strength is highly variable. Current distribution of this species in the basin probably differs little from historic distribution, but current abundance is much less than historic abundance. This correlates well with larger scale information contained within the ICRB Component Report , where distribution of this species over its entire range is described as similar to historic distribution, but population abundance within this range has been significantly or drastically reduced in many areas.

Although numerous subpopulations exist, the fluvial component of this metapopulation is either very depressed or essentially nonexistent, probably due to angling mortality and habitat degradation in the lower reaches of larger tributaries such as Newsome Creek and Crooked River. Idaho Department of Fish and Game manages the South Fork Clearwater River under its general fishing regulations, which allows a six trout limit per day. The lower reaches of some tributaries and the mainstem South Fork itself are paralleled by road, and thus, such stream reaches are readily accessible to anglers. Fishing pressure is often high in these areas, and larger fluvial cutthroat trout are rarely observed.

Typically, cutthroat trout in the subbasin are found as small resident fish in the upper third of the major tributaries, with an occasional fish located in the downstream reaches of these tributaries or the South Fork Clearwater River itself. Although these subpopulations are generally not isolated from the mainstem by physical barriers, migration may be impeded by high water temperatures in the summer and high flows and suspended sediment during the spring runoff period.

Most cutthroat trout spawn in the upper reaches of small streams. For resident populations, such as those found in the South Fork Clearwater subbasin, spawning probably occurs within the area occupied by the population with little or no extensive migration to other areas. If a fluvial component of this metapopulation exists, it is likely small, and this is a departure from the historic condition.

Current spawning and rearing areas for westslope cutthroat trout span a variety of ALTAs and stream types, including ALTAs 1, 2, 5, 21, 6, and 4. Review of presence/absence data and population strength data suggests that the current distribution of this species may be dependent on factors other than ALTA and stream type, however. A fairly consistent predictor of presence was location in the watershed. Allopatric westslope populations appeared to have the highest densities of individuals and were found either in the upper third of tributaries or in tributaries with no or limited access to fish in the mainstem South Fork. Examples of such subpopulations included Upper Mill Creek, West Fork Crooked River, Wing Creek, and two tributaries to Johns Creek. Presence/absence of anadromous fish and accessibility by humans may be the most important determinants of both presence/absence and population strength for this species. It is unknown if and how much a significant fluvial component would affect this relationship.

In summary, westslope cutthroat trout occurred over a range of ALTAs and stream types within the South Fork Clearwater subbasin, with strong subpopulations occurring mostly in the upper reaches of South Fork tributaries or tributaries with difficult or no access to the South Fork. Westslope cutthroat trout were also documented incidentally throughout the South Fork subbasin. Historic cutthroat distribution was probably limited more by presence of anadromous fish than by habitat limitations. Current distribution and abundance of cutthroat trout is probably limited by decline in habitat condition and fishing pressure, both of which are strongly correlated with streamside road density. Several small subpopulations exist in moderately or heavily road areas, but in general, stronghold cutthroat trout populations are found in streams with no or few roads nearby.

Current Migration and Late Rearing - The South Fork Clearwater River had an inherently high capability to support migratory westslope cutthroat trout, principally in the tributaries and the mainstem itself, even in the presence of anadromous fish. Most of the larger tributaries to the South Fork are physically accessible to migrating fish, at least in their lower reaches, and migration barriers for westslope cutthroat trout may consist of high summer water temperatures in the South Fork, high suspended sediment in the spring in the South Fork, angler mortality for fish migrating in roaded portions of the watershed, or simply distance.

Currently, migration is mostly limited to areas within or adjacent to those currently occupied by resident populations, with occasional downstream migration which would account for the sporadic appearance of individual cutthroat trout in the lower reaches of larger tributaries and the mainstem itself. Long-distance migrations of larger fluvial fish between the tributaries and the South Fork or even out of the South Fork are probably the exception rather than the rule, as evidenced by the low numbers of large (>300 mm) fish in the mainstem and tributaries.

Watershed Connectivity - As previously discussed, the South Fork Clearwater River has a high level of connectivity in terms of geophysical attributes, but the overall connectivity capability of the South Fork has been reduced through loss of habitat in the lower reaches of the tributaries and the mainstem, which has resulted in the increase of distance between good or refuge habitats and strong populations. The loss of habitat in these streams has thus reduced the likelihood of effective dispersal. In summary, important westslope cutthroat trout subpopulations remain physically connected to the larger Clearwater basin, but the distance between these subpopulations and the quality of the habitat between them may preclude effective migration.

Population Dynamics and Viability - As previously discussed, westslope cutthroat trout in the South Fork Clearwater subbasin generally comprise a group of isolated subpopulations with individuals found sporadically downstream. Subpopulation strongholds are largely located at the headwaters of major tributaries such as Crooked River, Mill Creek, American River, and Newsome Creek. Subpopulations are largely isolated by poor habitat conditions in the lower tributaries and mainstem and distance between subpopulations. Isolation is therefore likely but not absolute. Given that subpopulations are largely located at higher elevation headwaters, fish are probably slow-growing and mature at age 4, 5, or 6. Most adult fish in the spawning population are small (<300 mm) and have low fecundity (< 500 eggs/female). Angling mortality, while significant in the lower reaches of tributaries and the mainstem itself, is probably low in isolated populations due to the roadless nature of these areas and difficult angler access. Numbers of cutthroat trout in these areas are most likely limited by habitat carrying capacity rather than predation or direct mortality. Population size is also limited by the lack of larger fluvial fish, which have higher fecundities and thus higher ability to recruit more individuals to the overall population, in addition to providing a more diverse gene pool due to migration among subpopulations.

The risk factors described above suggest that individual subpopulations are subject to extinction due to stochastic risks. Stochastic risks have been characterized as demographic and environmental (Leigh 1981; Shaffer 1991; Ginzburg et al. 1990). Demographic stochasticity includes the random variation in individual birth, reproduction, or other characteristics even though the underlying rates may be stable. Environmental stochasticity includes random variation in mortality and birth rates driven by environmental variations. Of the two, cutthroat populations in the South Fork Clearwater subbasin are more likely influenced by environmental stochasticity. Cumulative subpopulation extinction from stochastic events could lead to the disappearance of this species from the basin because of subpopulation isolation. Given that little or no migration occurs among subpopulations, extinct subpopulations are unlikely to be refounded with individuals from other subpopulations.

Stochastic environmental effects include but are not limited to catastrophic wildfire or floods which result in complete alteration of the stream. Both of these events are considered pulse events, meaning that effects occur at one point and time but are not sustained over time. Such events could result in extinction of a subpopulation, but more often a reduction in the subpopulation numbers occurs but number of individuals quickly recovers in the ensuing years following the event. Westslope cutthroat trout evolved with these types of events and are apparently quite resilient (Rieman and Apperson 1989). Recovery of the subpopulation may fail, however, if watershed recovery is hindered by other impacts. Press events are those which are established on the landscape and affect the watershed on a continuous basis. An example of a press event is construction of a road that encroaches on a stream; although impacts can be reduced, a permanent change has occurred and will affect the watershed over time. A watershed affected by press events often has reduced resilience to both natural and human activities, and subpopulations located in watersheds with high levels of press disturbance are therefore at much higher risk of extinction from stochastic events.

Subbasin Key Factors/Threats - The key factors and threats to westslope cutthroat trout identified in the ICBEMP Component Report are applicable to cutthroat trout in the South Fork subbasin and are used to discuss the current factors and threats to cutthroat trout in the South Fork.

(1) Introduced Species - Impacts from introduced species in the South Fork subbasin primarily involve brook trout, which are strongly established in several tributaries, including Upper Red River and Silver

Creek. Other tributaries where they are present include Crooked River, Newsome Creek, and American River (Map 37). Brook trout are a known risk to westslope cutthroat trout, particularly where subpopulations are isolated (Griffith 1979, 1988; McIntyre and Rieman 1995; Rieman and Apperson 1989). The most notable brook trout population the South Fork is located in Silver Creek, where brook trout is the only salmonid species found above an impassible barrier located about 0.25 mi from the mouth. It is unknown if westslope cutthroat trout occupied this stream prior to brook trout introduction. Brook trout are also found sympatric with westslope cutthroat trout in other tributaries. These westslope subpopulations are therefore at risk from brook trout encroachment, although the two species have apparently coexisted through time since brook trout were introduced. Upper Red River is probably most likely to be impacted most from brook trout, since habitat conditions favor this species (low gradient, high summer water temperatures).

Other potential impacts to cutthroat trout from introduced species include loss of genetic integrity from hybridization with introduced species such as yellowstone cutthroat trout and hatchery rainbow trout. In the South Fork subbasin, cutthroat trout evolved in the presence of steelhead trout, and although hybridization is possible, the two species are reproductively isolated based on distribution in the basin and disparate spawning periods. Spawning populations of hatchery rainbow trout have not been documented, although rainbow trout have been stocked both in streams and high lakes in the subbasin. Yellowstone cutthroat trout may have been stocked in some high lakes in the basin in the past, and some loss of genetic integrity may have occurred in subpopulations in Johns Creek, Crooked River, and Tenmile Creek. Current direction for stocking these lakes includes only the use of westslope cutthroat trout; loss of genetic integrity is therefore as a result of past stockings of non-native cutthroat trout. No genetic analysis of cutthroat trout from the South Fork subbasin has been completed, however, and it is possible no loss of genetic integrity has occurred.

(2) Angling - As previously discussed, angling in the mainstem South Fork and lower reaches of larger tributaries has probably resulted in a serious reduction or elimination of the fluvial component of this cutthroat population. Angling pressure is directly correlated with the presence of roads adjacent to streams, especially the lower reaches of larger tributaries in the upper basin. Most subadult cutthroat trout in these areas are harvested, and although cutthroat trout are present in these reaches, the number of individuals, particularly the number of individuals greater than 200 mm, is low. Cutthroat trout are most numerous in areas with few or no roads adjacent to streams. Harvest of up to six cutthroat trout per angler per day is legal under current fishing regulations. This harvest limit combined with roads adjacent to streams and degraded stream conditions will probably not result in reestablishment of a fluvial population. Loss of the fluvial component has resulted in isolated subpopulations, lower recruitment to the population, and a higher risk of subpopulation extinction, as discussed above.

(3) Habitat Disruption - Isolation and fragmentation of subpopulations is believed by many to contribute to a high risk of extinction in salmonid populations. Although most subpopulations of westslope cutthroat trout in the South Fork subbasin are not isolated by physical migration barriers, habitat degradation in lower tributary reaches and the mainstem itself, combined with large distances between subpopulation strongholds, probably result in partial or complete isolation.

Habitat degradation in the mainstem South Fork and lower reaches of tributary streams includes high summer water temperatures and excess deposited fine sediment. High summer water temperatures in the mainstem precludes use of these areas by adult and subadult cutthroat trout, and high sediment deposition may result in loss of interstitial rearing space in the winter, loss of pool habitat, and a simplification of habitat, All these effects may have occurred in the lower reaches of Red River, American River, and Newsome Creek, whereas extensive placer mining in both Newsome Creek and Crooked River has resulted in habitat simplification and loss of pool habitat.

Population Strength - Map 36b displays the population strength for westslope cutthroat populations where they are known to exist. A large portion of the basin was identified as a historic stronghold, including most of the upper basin, but current strongholds exist in the upper reaches of Johns Creek, Tenmile Creek, and Crooked River only. Meadow and Mill Creek are identified as population strongholds, because good cutthroat numbers exist in these watersheds in specific areas but habitat is degraded or at risk.

Summary of Westslope Cutthroat Habitat and Population Status

To summarize the current status of the habitat and populations of westslope cutthroat, a classification system that considers habitat potential, habitat condition, and species population status is used.

Areas with high to very high habitat potential are described as: 1) strongholds, when habitat condition is good, and the population is strong; 2) population strongholds, when the population is strong, and the habitat condition has been degraded; 3) habitat strongholds, when the habitat condition is good, and the population has been depressed; and 4) historic strongholds, when the habitat condition has been degraded and the population has been depressed.

Areas with low to moderate habitat potential are described as: 1) adjunct-secure, when habitat condition is good, and the population is strong; 2) adjunct population, when the population is strong, and the habitat condition has been degraded; 3) adjunct habitat, when the habitat condition is good, and the population has been depressed; and 4) adjunct, when the habitat condition has been degraded and the population has been depressed. This series of classifications uses the term adjunct differently than it is typically used to describe areas adjacent to focal or refuge habitats (Frissell, 1993). In this context, adjunct is used to describe areas of lessor habitat potential that are thought to support populations of the species less continuously than areas of higher potential.

Areas that provide subadult/adult rearing, over-wintering, or migratory habitat, are classified as: 1) nodal-high quality, when the habitat condition is high; and 2) nodal-degraded, when the habitat condition has been degraded.

Areas that provide water qualitiy to downstream habitat are called critical contributing areas, and are classified as: 1) critical contributing (CC)-high quality, when these water quality contributing areas contain high quality aquatic conditions; and 2) critical contributing (CC)-degraded, when the aquatic condition in these areas is degraded.

This summary of species status is used for each of the fish species assessed. For westslope cutthroat, Map 36b displays this current status. Four areas in the subbasin (Upper Johns Creek, Twentymile, Upper Tenmile Creek, and Upper Crooked River) are considered strongholds for westslope cutthroat. Mill Creek, Meadow Creek, and West Johns are considered population strongholds for westslope, due to high densities in these areas and the habitat condition being degraded. Lower Johns and lower Tenmile are considered habitat strongholds. Newsome Creek, American River, Red River, and lower Crooked River are considered historic strongholds for westslope cutthroat, although there are isolated local populations with high densities in these watersheds. Wing Creek is considered a secure adjunct population, while Cougar and Peasley Creeks are considered adjunct degraded. The mainstem South Fork Clearwater River provides critical nodal habitat (subadult/adult rearing) that is in a degraded condition.

Westslope Cutthroat Trout Findings -

1. Westslope cutthroat trout remain widely distributed throughout the subbasin (Map 36a). Current distribution is probably similar to historic distribution. The migratory component of this population has largely been extirpated. Resident subpopulations of varying strengths are found in the upper reaches of many South Fork tributaries.

2. Westslope cutthroat trout abundance has declined over the past five decades in the subbasin. The largest decline has been associated with numbers of fluvial fish, which are presently rarely or never observed either in the mainstem or in the lower reaches of larger tributaries where their presence is expected.

3. The South Fork Clearwater subbasin contains a large amount of habitat that has a high or very high capability to support westslope cutthroat trout (Map 36a). High habitat potential for this species is associated with higher elevation, smaller tributary streams which are currently not used heavily or at all by anadromous fish; these areas are also associated with ALTAs 1, 2, 5, 21, 6, and 4.

4. Current distribution of cutthroat strongholds in the subbasin is strongly correlated with low or no road density, especially at the sixth code watershed scale. This correlation is probably due both to sediment effects associated with roads and increased human access.
5. Harvest of cutthroat trout, habitat disruption, and introduced species are key factors responsible for the current status of the species in the subbasin. The threat of these factors has not been reduced, and viability of individual subpopulations is at risk.

Conservation Recommendations for Westslope Cutthroat Trout

1. Conserve existing cutthroat trout stronghold spawning and rearing areas and subadult/adult rearing habitats. These include Johns Creek, Twentymile Creek, Tenmile Creek, and Upper Crooked River.
2. Work cooperatively with Idaho Department of Fish and Game to evaluate fishing regulations and explore possibilities for reducing fishing pressure on accessible cutthroat trout habitat, to assist in the rebuilding of the fluvial component.
3. Restore migratory and nodal habitat, focusing on degraded tributaries in the upper basin and the South Fork mainstem.
4. Evaluate risks to the genetic integrity of westslope cutthroat trout in tributaries where yellowstone cutthroat trout may have been stocked in headwater lakes (Tenmile Creek, Johns Creek, Crooked River).
5. Explore the feasibility of reducing or eliminating brook trout where they pose a high risk to westslope cutthroat trout, both in high lakes and streams (Red River and West Fork Crooked River).
6. Restore aquatic processes and habitat condition in high to very high potential spawning and early rearing areas where habitat has been degraded, including Mill Creek, Meadow Creek. Newsome Creek, American River, Red River, and lower Crooked River. Focus in areas with high streamside road densities.

Pacific Lamprey

The following information is summarized from the ICRB Aquatic Component Report.

General Information - The Pacific lamprey is an anadromous and parasitic lamprey widely distributed along the Pacific coast of North America and Asia. Traditionally, Pacific lamprey were an important ceremonial and subsistence resource for native peoples. They occur in all areas that remain accessible to salmon and steelhead (Simpson and Wallace 1978). The Idaho Department of Fish and Game lists Pacific lamprey as a state endangered species.

Distribution and Status - Historic runs of Pacific lamprey were large; some years 400,000 lampreys were counted as they migrated past Bonneville Dam (Harrison 1995). Counts of lamprey passing Ice Harbor Dam on the Snake River totaled 40 in 1993 and 399 in 1994, compared with the 1960s when nearly 50,000 were counted annually (Harrison 1995).

Similar to other anadromous fishes, the distribution and abundance of Pacific lamprey has been reduced by the construction of dams and water diversions as well as degradation of spawning and rearing habitat. Lamprey are excluded from large areas where they were historically present, including upstream from Hells Canyon Dam on the Snake River and Chief Joseph Dam on the Columbia River. Landlocked populations have been found in areas from which the anadromous form has been precluded (Wallace and Ball 1978), but they have not persisted and Beamish and Northcote (1988) concluded that metamorphosed lamprey were unable, in such areas, to survive to maturity.

Habitat Relationships/Life History Strategy - Pacific lamprey adults enter freshwater between July and September and may migrate several hundred kilometers inland. They do not mature until the following March. They spawn in sandy gravel immediately upstream from riffles between April and July and die soon after. Eggs hatch in two to three weeks and the ammocoetes (juvenile lamprey) spend up to the next six years in soft substrate as filter-feeders before emigrating to the ocean. They remain in the ocean for 12 to 20 months before returning to freshwater to spawn. Diatoms appear to be a primary food supply for ammocoetes.

Key Factors/Threats - The Idaho Chapter of the American Fisheries Society concluded that dams on the Snake and Columbia Rivers, alteration of streams, and harvest of ammocoetes by bait fishermen are the most serious threats to the Pacific lamprey in Idaho. Pacific lamprey, similar to salmonids, are likely vulnerable to land disturbances that cause sedimentation in nursery streams. The ammocoetes depend on quality habitat in freshwater for up to six or seven years before they emigrate to the ocean. Such an extended period in freshwater makes them especially vulnerable to degraded stream conditions. Their anadromous life history necessitates maintenance of access to spawning and rearing areas. Water quality consistent with robust diatom production may be a key factor for their continued existence.

Distribution and Status in the South Fork Clearwater Subbasin - Ammocoetes have been captured in Red River during electrofishing for salmonids, and adult lampreys have been observed anecdotally by fishermen. Lampreys have not been officially documented in other areas of the South Fork, although it is likely that they are also found in American River. The total distribution and abundance of lampreys in the South Fork is unknown, but given the above discussion, it is a virtual certainty that this native species's distribution and abundance are severely reduced from historic conditions.

Key Factors/Threats in the South Fork Clearwater Subbasin - Based on the above general discussion, key factors/threats in the South Fork are probably related to degraded habitat conditions in Red River and American River and downstream effects.

Conservation Recommendations -

1. Restoration of habitat conditions in Red and American Rivers.
2. Work cooperatively with Idaho Department of Fish and Game to better define the status of the South Fork population, threats to the continued persistence, and develop a conservation strategy.

Aquatic Species Summary

The South Fork Subbasin contains a significant amount of habitat with high to very high potential to support the aquatic fish species assessed, particularly in the low relief hills (ALTA 6 and 18) of the upper subbasin. The subbasin is a very important area for fish species when evaluated within the broader context of the Columbia River Basin.

The anadromous fish (spring chinook and steelhead) currently present in the subbasin are primarily a result of restocking efforts following removal of the Clearwater and Harpster dams. These dams eliminated most, if not all, of these species from the subbasin, with the exception of pacific lamprey. While these species are now naturally reproducing, they continue to be supplemented through hatchery outplanting.

The resident species (bull trout and westslope cutthroat) in the subbasin are thought to be of wild origin, with the exception of any hybridization that has occurred with introduced species. The extent of this has not been assessed.

The aquatic fish species remain widely distributed throughout the subbasin. Their current distribution is probably very similar to the historic distribution in the subbasin. The abundance of all fish species has declined significantly from historic levels. The most conspicuous declines have been in the anadromous fish species and the larger fluvial resident fish.

For the anadromous fish, downstream factors outside the subbasin are believed to represent the greatest contribution to the decline, while factors within the subbasin, particularly habitat degradation, have contributed as well. For spring chinook, large amounts of high potential habitat in the subbasin have been moderately to severely degraded from human activity, principally in the tributary mainstems in the upper subbasin. For steelhead, while large amounts of high potential habitat have been degraded, a significant amount of high quality habitat remains intact.

Resident fish are found locally abundant, but the numbers of these healthy local populations are reduced from historic. The larger migratory, fluvial fish of these species are found in very low numbers. For bull trout, the strongest populations exist in the southern part of the subbasin, at higher elevations in high quality habitat, which are thought to be principally resident populations. For westslope cutthroat, the strongest populations are found in the southern and lower portions of the subbasin, although there are pockets of higher abundance in the upper subbasin, generally correlated with unroaded areas. The primary impact on the abundance of these species is the combined effect of simplified habitat and fishing pressure, particularly for the larger migratory fish.

The viability of the aquatic species in the subbasin is at risk. Threats to the viability of these species include introduced species, habitat degradation, harvest, and population fragmentation. Stabilization of the anadromous species will require changes in downstream threats and the restoration of high value habitats in the upper basin. For resident species, stabilization of the populations will require rebuilding of the migratory component of these species, which will require restoration of high value nodal habitats, and reducing the threat of introduced species.

Vegetation

Overview

Plant communities in the subbasin can be seen as a mosaic of patches that change in composition, size, and juxtaposition over time. Wildlife and human uses respond to the existing pattern of vegetation. Processes like plant community succession, fire, insect and disease activity, drought and grazing, all change the pattern that exists at any one time. Features like climate, soil, slope, aspect and elevation, control the bounds within which patterns can change. Vegetation Response Units (VRUs) and Habitat Type Groups (HTGs) within VRUs were used to describe these bounds. VRUs are shown in Map 5, and Habitat Type Groups within VRUs are shown in Map 4. Within these delineations, presettlement processes like climate, fire, and insect and disease activity were likely to operate within predictable ranges. Understanding how these disturbance regimes worked, and the pattern of vegetation change, is fundamental to ecosystem management in the subbasin. This understanding can be used to design management systems that sustain patterns of vegetation and the scale, frequency, and kind of change to which native species are adapted.

Historic Vegetation Conditions

John Leiberg surveyed the Bitterroot Forest Reserve in 1897-98 (Leiberg 1898). He mapped the subbasin except for those portions west of Tenmile Creek, and the Camas Prairie west of Harpster. Recent burns (to perhaps 40 years old), covered about 40 percent of the area surveyed. Small trees (poles) or open stands of medium trees probably amounted to about another 40 percent. Eighty-two percent of the area surveyed was dominated by lodgepole pine. Ponderosa pine was of more limited extent (2 percent), mostly near the main canyon. Douglas-fir amounted to about 5 percent of the area. Grand fir dominated old growth was abundant on the ridges west of Newsome Creek and in mixed stands throughout the area (8 percent). Western larch was seldom dominant (less than one percent), but large old larch were not uncommon. Most stands were noted in 1911 as having little regeneration in the understory and light brush, indicative of recurrent low or mixed severity fire. Whitebark pine was widely distributed above 6000 feet but seldom dominant (less than one percent). Western white pine was not mentioned by Leiberg but was noted in the northwest portion of the assessment area from Sears to Meadow Creek in a survey in 1911. Map 9 shows the general distribution of forest cover in the National Forest area of the subbasin from the 1911 survey. Acres and percent in each class are shown in Table 3.18.

Table 3.18 - Historic Vegetation Size Classes - 1911		
Size Class in 1911	**Acres**	**Percent of surveyed part of the Subbasin**
Not Mapped	241,071	32%

Recent Burn (includes seedling and sapling)	187,662	25%
Low volume timber (open pole)	8,585	1%
High volume timber (closed pole, medium tree or large tree)	315,459	42%

Vegetation Cover Types and Size Classes

The following analysis and discussion of historic and current vegetation used aerial photo interpreted data from 1959 and 1991 for subsampled watersheds, and satellite imagery and photo interpretation for the entire Subbasin for current status. Historic and existing data for subsampled watersheds was available from the ICRB Science Assessment. Historic data were not available for the entire Subbasin. Cover types for subsampled watersheds in 1959 and 1991 are shown in Maps 38 and 39. Current vegetation cover types for the entire Subbasin are shown in Map 40. Even by 1959, harvest at the west end of the Forest had been extensive, so the changes reflected here do not describe the full extent of change in the drier low elevation forest types. Some apparent changes may be due to using limitations of the sampling strategy. Greatest changes are:

- ❑ Declines in ponderosa pine (especially large pine) and lodgepole pine dominated communities due to harvest, fire suppression and forest succession.
- ❑ Increases in more shade tolerant tree species, like subalpine fir and grand fir, due to fire suppression and forest succession.
- ❑ Declines in shrubland, riparian shrub, and riparian meadow due to forest encroachment, agricultural conversion, and forest succession
- ❑ Conversion of foothills grassland on prairie and hill slopes to cropland, hay, and pasture, has been extensive on private lands.
- ❑ Annual grasslands and noxious weeds have become established on grassland habitat types on low elevation steep south facing slopes. These are not documented in the subsampled watershed data.
- ❑ Whitebark pine has declined seriously from blister rust, fire exclusion and mountain pine beetle. Western white pine, never abundant, has also declined from blister rust. These are not documented in the subsampled watershed data.
- ❑ Early seral structural stages, including forest openings, seedling and sapling, and pole stands, with snags and down wood, have decreased because of fire suppression. Medium and large tree classes have increased in most areas except larch and ponderosa pine forests.
- ❑ Large patches of fire-killed snags have declined with fire suppression.

Table 3.19 shows changes in cover types from 1951 to 1991 in subsampled watersheds. Changes thought to be significant and real are in bold type.

Table 3.19 - Changes in Vegetation Cover Types in Subsampled Watersheds

Cover Type	1959 Acres (Percent)	1991 Acres (Percent)	Percent Change
Hay or pasture	30 (<.1)	835 (.6)	+2,683
Foothills Grassland	411 (.3)	1,698 (1.2)	+313
Disturbed Grassland	**236 (.2)**	**399 (.3)**	**+69**
Montane park	**730 (.5)**	**0 (0)**	**-100**
Shrubland	**851 (.6)**	**292 (.2)**	**-65**
Riparian Meadow	**1,798 (1.3)**	**1,119 (.8)**	**-38**
Riparian Shrubland	**636 (.4)**	**115 (<.1)**	**-82**
Bare Clearcut	**0 (0)**	**1,317 (.9)**	**(+)**

Herbaceous Clearcut	**174 (.1)**	**1,890 (1.3)**	**+986**
Ponderosa pine /Douglas-fir	**20,098 (14.0)**	**17,881 (12.5)**	**-11**
Lodgepole Pine	**45,351 (31.7)**	**35,855 (25.1)**	**-21**
Subalpine fir	**1,421 (1.0)**	**3,207 (2.2)**	**+126**
Mixed Conifer	**70,732 (49.4)**	**77,496 (54.2)**	**+10**
Rock or Gravel bars	608 (.4)	789 (.6)	+30
Barrenland	0 (0)	32 (<.1)	(+)

Table 3.20 and Maps 41 and 42 characterize vegetation size classes in 1959 and 1991 for subsampled watersheds. Map 43 shows the current distribution of size classes for the entire subbasin. Some changes between 1959 and 1991 in table 3.20 may be insignificant due to sampling error.

- The increase in the nonforest and nonstocked size class is due to harvest, some agricultural conversion, and other development.
- The decreases in the seedling/sapling and pole classes and increases in medium and large tree classes are due to forest succession and fire suppression.

Table 3.20 - Changes in Vegetation Size Classes in Subsample Watersheds

Size Class	1959 Acres (Percent)	1991 Acres (Percent)	Percent Change
Nonforest and Nonstocked	5,474 (3.8)	8,486 (5.9)	+55
Seedling/Sapling	11,289 (7.9)	5,120 (3.6)	-55
Pole	36,346 (25.4)	21,185 (14.8)	-42
Medium tree	45,835 (32.0)	52,063 (36.4)	+14
Large Tree	44,126 (30.8)	56,071 (39.2)	+27

Tables 3.21 and 3.22 show current extent of cover types and size classes for the entire subbasin, from aerial photo interpretation and satellite imagery. These data are from a different source than the subsampled watershed data, and some discrepancies arise from different mapping conventions. For example, the subsample data indicate more riparian shrubland than the current data for the entire basin.

Table 3.21 - Existing Vegetation Cover Types

Cover Type	Percent of Area in Entire Subbasin
Towns	.3
Cropland	17.0
Hay or pasture	3.0
Foothills Grassland	1.2
Disturbed Grassland	1.2 *
Montane park	.2
Shrubland	1.6
Riparian Meadow	.1
Riparian Shrubland	<.1
Herbaceous Clearcut	.7
Ponderosa pine /Douglas-fir	2.2
Lodgepole Pine	11.7
Subalpine fir	2.8
Mixed Conifer	47.1
Whitebark pine	.3
Rock or Gravel bars	1.0
Barrenland	<.1

Water	<.1

The extent of disturbed grassland is predicted based on occurrence of steep south aspects on bunchgrass habitat types below about 4000 feet elevation on private lands, and some Forest lands.

Table 3.22 - Existing Vegetation Size Classes

Size Class	Percent of Area in Entire Subbasin
Nonforest	27
Seedling/Sapling	13
Pole	9
Medium Tree	23
Large Tree	28

Old-Growth Forests

Old-growth may be described simply as forests having old trees and related structural attributes, like snags and down wood (Moir 1992). Old-growth characteristics vary by region, forest type, and local conditions. In this subbasin, old-growth and their historic settings can include 1) open stands of ponderosa pine maintained by frequent low severity fire, 2) multilayered stands of grand fir and Engelmann spruce with periodic small fires, much rot and down wood, 3) mixed stands of young and old Douglas-fir, western larch, and grand fir with periodic mixed severity fire that usually left some large old trees intact, 4) multilayered stands of Engelmann spruce and subalpine fir along stream bottoms or other areas protected from fire, and 5) occasional stands of whitebark pine, lodgepole pine, or Douglas-fir missed by past fire, but seldom persisting long in a specific landscape position. Leiberg described only a few types and areas of extensive old-growth in 1898: grand fir on the ridges west of Newsome Creek, scattered western larch overstories along mid elevation ridges throughout the basin, and ponderosa pine along the west river valley. To develop a basis for estimating the possible amount and location of current old-growth, we compared old aerial photos to current stand data. Map 44 shows where large trees dominated stands in the 1930s and 40s, and where the same stands remain today. Also see Appendix F.

- Many of the stands that were fairly large trees in the 30s and 40s, and still exist, would probably be considered old-growth today, using the north Idaho criteria (Green et al. 1991). In the 1930s and 1940s, about 27 percent of the acres on the National Forest lands of the subbasin were stands of mature (probably 80 years or more), but not necessarily old growth at that time.
- Stands with large trees historically tended to be concentrated at the north and west ends of the subbasin, in areas maintained by frequent low severity fire (VRUs 3 and 4), or on moist sites where fire was infrequent (VRUs 7 and 10). In other parts of the subbasin, stands with large trees tended to be more fragmented from one another, often associated with north slopes and draws where fire might miss them.

Noxious Weeds

Exotic plant species are an important ecosystem attribute to consider when assessing landscape conditions and vegetation objectives. As exotic or weedy species invade and establish, native species richness and frequency can be reduced, erosion rates can increase, ecological processes may be altered, and rare plants are threatened. Invasive exotic plants can expand following man caused or natural disturbances, and invade degraded as well as intact habitats. Noxious weeds can also have an economic impact. According to the Idaho County Assessor's Office, the assessed value of rangeland in the county has not increased over the last five years due to infestations of noxious weeds.

Many weeds found in the intermountain west were accidentally or intentionally introduced into North America between 1880s and 1920s. Without their natural predators and pathogens, the weeds have continued to expand. In many places the weeds are the dominant species of the existing plant community.

Noxious weeds found in the subbasin include common crupina, dalmation toadflax, diffuse knapweed, spotted knapweed, rush skeletonweed, orange hawkweed, meadow hawkweed, yellow starthistle, Canada thistle, Scotch thistle, leafy spurge, and hoary cress. Other invasive plants common to Idaho county that are a concern to managers include Mediterranean sage, Italian thistle, plumeless thistle, sulfur cinquefoil, medusahead, cheatgrass, japanese knotweed, common tansy and St. johnswort.

Table 3.23 - Inventoried Weeds

Weed Species	Number of sites	Acres
Rush Skeletonweed	1	1
Common cruprina	107	22,070
Canada thistle	152	944
Sulfur cinquefoil	2	74
Spotted knapweed	175	805
Yellow starthistle	52	8,514
Hoary cress	5	18
Italian thistle	13	75
Diffuse knapweed	1	4
Orange hawkweed	2	1
Meadow hawkweed	1	1
Dalmatian toadflax	16	25
Scotch thistle	5	22
Japanese knotweed	10	33
Leafy spurge	1	5

Present Situation - Weed colonization is an active process influencing many habitats in the subbasin. Many weeds currently found in the subbasin have the potential to spread into adjacent susceptible habitats and disperse along the transportation network. In addition, new weeds first introduced in other parts of North America are now reaching the intermountain region and the subbasin. These new weeds present an additional threat to the habitats within the subbasin. According to a regional database, approximately 250 exotic plants have been documented in north-central Idaho. Fifty of these plants have been designated as noxious by one of the states of the intermountain west.

Field surveys conducted the past several years have revealed 15 noxious weeds or exotic species of concern occupying over 32,500 acres within the subbasin. Individual infestations range in size from a few square feet to thousands of acres with the most common infestation covering approximately 1 1/2 acres. Even though the entire watershed has not been thoroughly surveyed, sufficient suitable locations including travel corridors, dispersed and developed campsites, and past timber treatments have been surveyed to indicate an undesirable situation has developed. It appears, from field observations, that the established weeds in the subbasin continue to spread into previously uninfested sites.

The majority of the identified infestations occur along the main roads and drainages, and within disturbed grasslands in the lower subbasin. Yellow starthistle, common crupina and cheatgrass have become firmly established in grasslands outside the transportation corridors. Canada thistle is common in the mid-elevation harvest units on the National Forest. Yellow starthistle and common crupina are the most abundant weed in the subbasin, followed by Canada thistle, spotted knapweed, sulfur cinquefoil and Scotch thistle. Other common weeds present in the drainage, but lack estimated acres, include St. johnswort, cheatgrass, medusahead, japanese knotweed and houndstongue. Eighty percent of the known infestations in the subbasin are located in the lower watershed, west of Silver Creek.

Yellow starthistle currently occupies over 8,000 acres within the lower canyon (private and public lands) between the Forest boundary and Kooskia. Starthistle has been spreading at a rate of 6-50% over the last 15 years. Small isolated infestations tend to have the greatest rate of spread. Small isolated infestations are being discovered annually. Spotted knapweed has established along the main transportation corridors and the beaches of the South Fork. It has been steadily spreading to higher elevations over the last 20 years.

Table 3.23a - Habitat Type Groups Vulnerable to Various Noxious Weeds

Existing and Potential Noxious Weeds/Exotic Plants	HTG 1 dry conifer	HTG 15 grassland	HTG 30 shrub	HTG 60 meadows	HTG 2 (disturbance)
Yellow starthistle		●			
Spotted Knapweed	●	●	●		●
Scotch thistle	●	●			
Dyers Woad		●			
Sulphur cinquefoil	●		●		●
Common tansy				●	●
Rush Skeletonweed		●			
Dalmation toadflax	●	●	●		●
Hoary cress				●	
Canada thistle				●	●
Cheatgrass	●	●			
Leafy spurge	●		●	●	●
Common crupina	●	●			●
Diffuse knapweed	●	●			
Purple loosestrife				●	
Orange hawkweed				●	
Yellow hawkweed				●	
Matgrass				●	
Medusahead		●			
Acres Susceptible to Weeds: Subbasin	6,776	120,491	42,706	0	65,682
Acres Susceptible to Weeds: National Forest lands	2,646	667	36	88	38,254

Acres at Risk to Noxious Weed Expansion - Map 45 shows areas most susceptible to weed invasion in the subbasin, based on habitat type group. Habitat Type Groups 1 (warm/dry ponderosa pine), 15 (bluebunch wheatgrass and Idaho fescue), and 30 (dryland shrub habitat types), and 60 (meadows) are inherently susceptible habitats that specific weeds can colonize and dominate without man caused or natural disturbances. The weeds are capable of invading intact native plant communities and out competing native plants for nutrients, water and growing space. HTG 2 (Douglas-fir, ponderosa pine or dry grand fir habitat types with shrub understories) are vulnerable to weed colonization if soil is disturbed. The disturbance could be man-caused or natural.

Noxious weeds are also found along the edges and openings of habitat groups that are not inherently susceptible to weed invasion, like roadsides. Disturbances may allow short term expansion of weeds into areas. These weeds may not represent a risk to the existing plant community or pose a threat to ecosystem process and function, but can act as a seed/propagule reservoir for future dispersal into more suitable sites. Weeds can establish from many small disjunct patches from independent populations. With time and available suitable habitat, these patches may expand and coalesce into an apparently single infestation. Small infestations that do not pose a current threat to the existing plant community may still contribute to the spread of the species by acting as a founder population for new disjunct patches.

In the past, weed management has been uncoordinated, sporadic, and largely ineffective in controlling weed invasions in the analysis area. Since noxious weeds and other invasive exotic plants can affect ecological integrity, habitat conditions, and the achievement of restoration objectives, exotic plants must be integrated into management strategies and prescriptions developed for the subbasin.

Insect and Disease

An index of forest health is its capacity for renewing itself (Leopold 1949). This assessment has used the comparison of historic and current pattern and process as the most appropriate measure of ecosystem health. A landscape that retains critical elements (communities, processes, and patterns) is considered to have the most likelihood of being able to renew itself after stress and to retain its productive potential (Hahn and Hagle 1993). The following discussion addresses just one aspect of forest health: the changes that have occurred in forest vegetation, and how this is likely to affect susceptibility to some insect and disease organisms.

A common defoliating insect in the subbasin is Engelmann spruce budworm (Carlson 1993). Outbreaks seem to be sporadic and cause some mortality or susceptibility to bark beetle attack in susceptible tree species. Host species are later seral species like grand fir, subalpine fir, Engelmann spruce, and Douglas-fir, which have increased with fire suppression. Trees stressed by overcrowding or other sources of drought, and multistory stands of susceptible trees, increase the severity of attacks. Natural controlling agents are predators and parasites including wasps, flies, birds, ants, spiders, and beetles. Changes in vegetation in the subbasin suggest that susceptibility to budworm outbreaks has probably increased over historic levels, because of changes in tree species composition and stand density, mostly at mid and low elevations. However, actual changes in activity levels have not been observed, perhaps due to the sporadic nature of budworm outbreaks, and their dependence on other climatic factors.

Mountain pine beetles attack ponderosa pine, lodgepole pine, western white pine and whitebark pine. They select larger (usually older) trees and trees stressed by drought or other agents. The cycle in which older lodgepole pine (Amman 1991) are killed by beetle activity, are replaced by fire, and regenerate to lodgepole pine, is widely recognized. Ponderosa pine is a host for western pine beetle, and Douglas-fir for Douglas-fir beetle. With fire suppression, more Douglas-fir has grown into larger size classes, susceptible to beetles. Nematodes, fungi, flies, beetles, birds, and cold temperatures are important controls on beetle populations. Beetle activity levels were historically strongly linked to patterns of fire and drought. Fire weakened or drought stressed trees are most susceptible. Large patches of post-fire stressed trees used to occur periodically. Today, larger, continuous areas of older, more susceptible trees are now present in the subbasin in the lodgepole, whitebark, and Douglas-fir communities. The possibility exists for larger epidemic outbreaks of some bark beetles.

Blister rust is an exotic pathogen that was introduced to the United States in 1909 (Monnig and Byler 1992). Western white pine and whitebark pine are highly susceptible. Western white pine has been virtually eliminated from its historic range. Whitebark pine has suffered high mortality in many areas. There has been considerable progress in development of rust resistant white pine varieties, but little work has been done with whitebark pine. Whitebark pine is being replaced in the subbasin by subalpine fir, Engelmann spruce, lodgepole pine, or montane herb or shrublands (Quigley et al. 1997).

Root diseases are fungi that can affect all sizes, ages and species of tree (Hagle, Tunnock, Gibson, and Gilligan 1987). In the subbasin, grand fir and Douglas-fir are most highly susceptible and the prevailing root pathogens affecting them are armillaria and annous root rots. Area susceptible to root disease appears to have increased as forests in the subbasin have shifted to more grand fir and Douglas-fir. The effects have been to create forest openings, favoring shrubs, hardwoods, and regeneration of more susceptible grand fir. Levels of inoculum have probably increased in some areas. At very high levels, more tree species become susceptible. Fire tends to decrease root rot by favoring species like pine or western larch that are more resistant to root rots.

Five species of dwarf mistletoe affect conifers in the subbasin. Douglas-fir and lodgepole pine are most commonly infected. The characteristic witch's brooms indicative of mistletoe provide hiding cover and resting areas for birds and small mammals. Mistletoe decreases tree vigor. It increases with development of dense or two story stands in which the plant parasite is spread more readily. These changes are likely to have occurred in many low and mid elevation Douglas-fir stands. Lodgepole stands are more likely to have Engelmann spruce and fir in the understory, so spread is unlikely. Stand replacing fire will eliminate mistletoe from the affected area for a short while.

Fire Disturbance

Table 3.24 shows acres of wildfire by decade in the National Forest portion of the subbasin, and harvest by decade. Map 10 shows fires burned by decade prior to fire suppression and Map 11 shows acres burned since fire suppression. Fire suppression became effective by about 1940. Not all areas included in mapped fire perimeters actually burned, but in many cases low severity fire occurred over much larger areas than were mapped.

- ❑The map, table, and stand origin information, suggest that fire was a pervasive disturbance within the subbasin before Euroamerican settlement. Fires affected almost 6000 acres per year before 1930, and since then have only burned about 400 acres annually.
- ❑Acres of harvest replaced acres of fire disturbance from 1960 through the 1980s, but the kind and pattern of harvest did not replicate the ecological effects of fire.

Harvest removes trees and sometimes heavily disturbs soil. Few snags and low levels of large down wood remain after harvest and slash treatment. The variation in distribution of fire patches in the landscape and over time is also more random and varied than regulation of the landscape through harvest has been. A management ignited prescribed fire program was initiated in 1985, on south aspects in the lower part of the canyon and in some pine plantations. This program has begun to compensate for years of fire suppression, but many areas, especially on north aspects, have not been treated. See the discussion of disturbance frequency and size by watershed for further treatment of how natural disturbances resulted in variation in state across the landscape.

Table 3.24 - Wildfire and Harvest on National Forest lands

Decade	Wildfire acres/ percent	Harvest acres/percent	Total acres/percent
1870	40497 ac / 7.3%	unknown	40497 ac / 7.3%
1880	99600 ac / 18.0%	unknown	99600 ac / 18.0%
1890	8186 ac / 1.5%	unknown	8186 ac / 1.5%
1900	38430 ac / 7.0%)	unknown	38430 ac / 7.0%)
1910	161440 ac / 29.2%	unknown	161440 ac / 29.2%
1920	5084 ac / 0.9%	unknown	5084 ac / 0.9%
1930	1763 ac / 0.3%	unknown	1763 ac / 0.3%
1940	5502 ac / 1.0%	233 ac / <.1%	5735 ac / 1.0%
1950	479 ac / 0.1%	3090 ac / 0.6%	3569 ac / 0.6%
1960	8349 ac / 1.5%	23154 ac / 4.2%	31503 ac / 5.7%
1970	5944 ac / 1.1%	32559 ac / 5.9%	38503 ac / 7.0%
1980	1928 ac / 0.3%	20155 ac / 3.7%	22083 ac / 4.0%
1990	159 ac / <.1%	10701 ac / 1.9%	10860 ac / 2.0%

Fire Regime Alteration

One of the principle goals of ecosystem management is to maintain evolutionary and ecological processes (Quigley et al. 1996). Hydrologic cycles, carbon cycles, and plant succession are essential ecological processes. Disturbance regimes describe the frequency, severity and scale of events, including fire, erosion, and peak stream flows, that provide settings for plant and animal communities. Significant alteration of disturbance regimes can affect the persistence of plant and animal communities, and exceed the rate of change to which species can adapt.

Fire has been a principal agent of change in landscapes in the subbasin. Fire regimes describe the frequency, severity, scale and pattern of fire in the landscape (Heinselman, 1981). Timber harvest and fire suppression have been more recent agents of change, and may not be sustaining ecological processes. To test this, we evaluated three forms of departure from historic fire regimes: frequency of disturbance, severity of disturbance, and size of disturbance, comparing historic fire to recent harvest.

Disturbance Frequency - Disturbance frequency was evaluated at two scales: the stand and the watershed. To evaluate changes in disturbance frequency at the stand scale, we used harvest history and coarse resolution fire history, as well as historic fire regime. If a stand had been harvested or was within a fire perimeter, and the fire or harvest had occurred within the maximum period for the fire regime of that stand, the stand was considered within the historic range for disturbance frequency. Stands outside that range are shown in Map 46. They are dominantly in the low elevation and canyon sites where historically frequent fire had been typical. Management ignited prescribed fires have compensated for some of the effects of past fire suppression on low elevation south aspects in the South Fork canyon. About 1000 acres have been burned annually since 1985. These are usually spring burns and do not necessarily replicate the effects of historic fires, but do reduce fuel accumulations.

Table 3.25 - Changes in Fire Disturbance Frequency

	Watersheds dominated by low frequency, often severe fire		Watersheds dominated by high and moderate frequency, low and mixed severity fire		Watersheds dominated by low frequency, mixed severity fire	
Disturbance Frequency in a 35 year Period	Historic Fire Disturbance Frequency (% of watersheds)	Harvest Frequency (% of watersheds)	Historic Fire Disturbance Frequency (% of watersheds)	Harvest Frequency (% of watersheds)	Historic Fire Disturbance Frequency (% of watersheds)	Harvest Frequency (% of watersheds)
none	30%	53%	30%	27%	44%	36%
1	55%	21%	57%	25%	54%	20%
2	15%	21%	10%	23%	2%	32%
3		4%	3%	12%		8%
4		1%		6%		
5				2%		4%
6				4%		

To evaluate disturbance frequency at the watershed scale, the frequency of harvest entry into a watershed from 1960 to the present was compared with the frequency of fire from the period 1870-1935 (pre-suppression). A disturbance is considered as any fire or harvest affecting 5 percent or more of a subwatershed. Watersheds were grouped by dominant VRUs for comparison. The results are shown in Table 3.25. The data are for disturbances affecting 5 percent or more of a prescription watershed. Only medium and high severity fires were included. The frequency for low intensity fires in some VRUs was much greater.

- ❑ Harvest entries into a watershed have been more frequent than the historic range of fire frequency for most kinds of watersheds, even those dominated by naturally frequent fire (VRUs 3, 4, 12 and 16).
- ❑ In watersheds with significant wilderness acres (dominated by VRUs 1,2, and 9), neither recent fire nor harvest has approached the historic frequency of fire disturbance.

It is important to remember that roads or severe mining impacts may alter states in profound and long-lasting ways. Roads and mining in some areas have had longer lasting impacts on watershed function than fire or harvest.

Disturbance Severity - To evaluate changes in vegetation disturbance severity, the severity of harvest treatment was compared to the historic severity of fire for the VRU in which the stand occurred. Clearcuts, seedtree cuts and shelterwoods with overstory removal were considered stand replacement or high severity. Thinning, and shelterwoods with no overstory removal, were considered low to moderate (mixed) severity treatments. Historic severity from fire was derived from analysis of R1EDIT plot data for sampled stands in this subbasin. Only data for trees older than 60 years were used to avoid effects of fire suppression. The results are shown in Table 3.26, summarized by VRU. Data for other VRUs were too limited to analyze.

- In VRUs 7 and 10 harvest has been more stand replacing than historic disturbance regimes indicate was typical.
- In VRU 3, the ratio of stand replacement to mixed severity disturbance is within historic range, but mixed harvest has often removed large old pine instead of maintained it.

Table 3.26 - Changes in Fire Disturbance Severity

VRU	Acres	Historic Fire Stand Replacement : Mixed Severity	Recent Harvest Stand Replacement : Mixed Severity
1	98,321	80:20	80:20
3	140,593	66:34	64:36
4	65,537	67:33	62:38
6	147,085	86:13	67:33
7	71,163	45:55	75:25
10	26,578	31:69	67:33

Disturbance Size - This analysis examined the size of individual fire and harvest disturbances as a percent of the prescription watershed in which they occurred. Table 3.27 summarizes these findings. Numbers are the percent of fire or harvest disturbances of this size range in prescription watersheds of this type. This ignores roads, which can be a permanent disturbance in the landscape. It also does not consider the unburned areas that occurred within historic fire perimeters, which were often common.

Table 3.27 suggests that heterogeneity in disturbance size was typical of most natural fire disturbances historically, and that recent harvest practices have tended to emphasize small, frequent disturbances rather than the full range of historic fire disturbance size and frequency.

Table 3.27 - Changes in Fire Disturbance Size

	Watersheds dominated by low frequency, often severe fire		Watersheds dominated by high and moderate frequency, low and mixed severity fire		Watersheds dominated by low frequency, mixed severity fire	
Size of Disturbance % of Watershed Affected	% of Disturbance from Fire	% of Disturbance from Harvest	% of Disturbance from Fire	% of Disturbance from Harvest	% of Disturbance from Fire	% of Disturbance from Harvest
<5%	21%	87%	32%	76%	34%	76%
5-10%	9%	10%	2%	17%	2%	18%
11-20 %	12%	1%	18%	5%	11%	5%
21-50%	18%	0.2%	21%	1%	24%	1%
51-80%	20%		15%	0.3%	23%	
81-100 %	20%		12%		4%	

This finding has important implications for species adapted to landscapes undergoing more large scale, infrequent disturbances, like fish species that depend on stable substrate, abundant woody debris, and cold water. Roads and mining have also had long lasting impacts on watersheds that must be considered as well as fire or harvest. Watershed ability to recover from disturbance and fish species' ability to recolonize streams after disturbance have been affected by chronic disturbances throughout the subbasin.

Fire Risk

Areas at risk of large severe fires outside the historic range of variability were identified using an approach adapted from that developed by the Boise National Forest (USDA Forest Service 1996).

The following habitat type groups, cover types, and canopy closure classes were identified through querying the timber stand data base, as likely to have fuel types outside the range of natural variability:

- Habitat type groups 1 and 2 (Douglas-fir and ponderosa pine), on all VRUs, all cover types, canopy closure classes greater than 40 percent;
- Habitat type group 3 (dry grand fir), on VRU 3 or 4, Douglas-fir/ponderosa pine or mixed conifer cover types, canopy closure classes greater than 70 percent;
- Habitat type group 9 (dry subalpine fir), VRUs 1, 2, 5, 6, 9; lodgepole pine cover type, pole size or larger, that have not burned within the last 120 years.

Areas with more than 20 percent of the watershed in these fuel types were rated as high risk. Areas with 10-20 percent of the watershed in these fuel types were rated as moderate risk. Areas with less than 10 percent of the watershed in these fuel types were rated as low risk for alteration of fuel conditions.

Ignition probabilities within watersheds were examined. Twenty years of recent data were used. If more than one ignition per decade per square mile occurred in the watershed, it was assumed that ignition risk was high. If both ignition probability and stand conditions posed high risks, fire risk was ranked as high.

Where these watersheds coincided with those identified as having complex land ownership patterns, or were within 5 miles of a forest boundary abutting private land, those watersheds were ranked as highest in fire risk to life and property. Map 47 shows watersheds with high risk including those with complex land ownership. These risk factors were then considered in developing integrated vegetation management themes.

Vegetation Response Units

More detailed discussion of vegetation is given by Vegetation Response Unit (VRU). (Map 5 and Table 3.28). Ranges shown in the VRU discussions are derived by using data from subsampled and other watershed analyses. Percent change is derived from comparing existing and historic (1959) conditions for the VRU in the subsampled watersheds.

Table 3.28 - Acres by VRU and ERU

	Vegetation Response Units												
ERU	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**12**	**16**	**17**
South Fork Canyon	373	0	49067	13174	0	15660	6968	420	0	1079	1982	0	1275
Meadow Creek	0	0	5252	7721	0	0	9457	0	0	1646	0	0	0
Cougar-Peasley Cr	0	0	5619	4156	0	0	6332	0	0	641	0	0	0
Silver Creek	853	21	3531	2407	0	0	4975	0	234	4326	31	0	0
Newsome-Leggett	2479	626	3787	0	0	10380	22743	0	210	7558	0	0	26
American River	974	0	74	0	0	36340	10077	674	392	10100	0	0	0
Red River	31040	0	1696	7767	0	60192	1931	0	80	667	0	0	0
Crooked River	22009	1225	6290	0	0	10945	3836	0	422	0	0	0	0
Tenmile Creek	11541	6899	5695	0	0	7102	0	0	3379	0	0	0	0
Wing-Twentymile	4762	198	3157	0	0	6470	4562	0	0	496	0	0	0
Johns Creek	22296	18927	14016	8607	2393	2104	256	0	4486	69	108	0	0
Mill Creek	2067	15	7560	7079	6605	0	0	0	0	0	0	0	0
Camas Prairie	0	0	34856	14631	0	0	0	0	0	0	8135	141543	1488
Subbasin Total	98394	27911	140602	63542	8998	149193	71137	1094	9203	26582	10256	141543	2763

VRU 1: Convex slopes, subalpine fir - This VRU is common in the South Fork at mid and upper elevations. Grand fir and subalpine fir habitat types are dominant. Lodgepole pine was historically dominant in many settings. Engelmann spruce, western larch, Douglas-fir, and whitebark pine were less common. Large, infrequent (75 to 150 years) severe fires were typical of most settings. Historically, about 700 acres burned per year in the subbasin. About 60-80 percent of stands originated from stand replacing fire, and 20-40 percent from mixed severity fire. Moist lower slopes were most prone to mixed fire. Lodgepole, western larch and Douglas-fir sometimes survived one or more fires to form a scattered overstory. Large blocks (500 to 2000 acres) of pole and medium-size fire killed trees were typically present at any time within 10,000 acres of this VRU. Mountain pine beetle activity cycled with fire in lodgepole pine, and may have been important in developing fuel conditions that favored stand replacing fire. Wet meadows are important elements of this landscape. Relative proportion by size class was about 5-10 percent nonforest (or nonstocked), 20-30 percent seedling/sapling, 20-30 percent pole, 20-30 percent medium tree, and 5-15 percent large tree at any one time over this VRU in the subbasin. Old growth was typically limited to moist draw bottoms and north slopes, and usually comprised from 10 to 15 percent of the area.

VRU 1: Changes from historic - With advancing forest succession and fire suppression, seral lodgepole pine, western larch, and whitebark pine have declined, and more shade tolerant grand fir and subalpine fir have increased. Lodgepole pine has decreased by 12 percent and Engelmann spruce-subalpine fir forests have increased by 9 percent. Blister rust has further reduced whitebark pine. Today, only about 70 acres of this VRU burn per year in the subbasin, a 90 percent decrease. Advancing forest succession has resulted in 88 percent reductions in seedling and sapling structural stages, and 37 percent increases in medium and large tree stages. Fire suppression has also resulted in increased stand densities, as shade tolerant understories develop. Harvest has affected about 10 percent of the acres. Recent harvest patterns have replaced large scale infrequent fire with frequent small harvest units more uniformly distributed across watersheds than occurred historically. The average harvest unit size is smaller than historic burn patch and there is not as much diversity in frequency of structural stages within subwatersheds. Each watershed is more like other watersheds in terms of the representation of structural stages. Extensive snag patches are no longer created as a result of fire suppression.

VRU 2: Glaciated slopes, subalpine fir - This VRU is common in the South Fork at upper elevations. Subalpine fir and whitebark pine habitat types are dominant. Lodgepole pine, Engelmann spruce, and subalpine fir were historically dominant on sideslopes. Whitebark pine was important on ridges. Historically about 400 acres burned per year in the subbasin. Midslopes tended to experience stand replacing fire at infrequent intervals (75 to 150 years). Open ridges or moist valley bottoms were more prone to mixed severity fire. Medium blocks (100 to 1000 acres) of pole size fire killed trees were often present at any time within 20,000 acres of this VRU. Rock outcrop, lakes and wetlands, and montane parklands were important elements of this landscape. Relative proportion by size class was about 10-25 percent nonforest, 10-30 percent seedling/sapling, 30-65 percent pole, and 5-15 percent medium tree. Old growth was typically limited to moist trough bottoms and open ridges, and usually comprised less than 10 percent of the area.

VRU 2: Changes from historic - With advancing forest succession and fire suppression, seral whitebark pine has declined. Blister rust has further reduced whitebark pine by a total of more than 75 percent. More shade tolerant Engelmann spruce-subalpine fir forest has increased more than 70 percent. Today, only about 18 acres burn per year in the subbasin, a 96 percent decrease. Advancing forest succession has resulted in an 84 percent decline in nonforest openings, a 71 percent decline in seedling and sapling structural stages, a 74 percent decline in pole stages, and a 746 percent increase in medium and large tree stages. Fire suppression has also resulted in increased stand densities in Engelmann spruce-subalpine fir forests, as shade tolerant understories develop. No recorded harvest has occurred. Extensive snag patches are no longer being created as a result of fire suppression.

VRU 3: Stream breaklands, grand fir and Douglas-fir - This VRU is common at lower to mid elevations in canyons.

On south aspects, dry Douglas-fir habitat types are dominant. Open stands of large Douglas-fir and ponderosa pine were historically common. Low and mixed severity fire at very frequent intervals (5 to 25 years) occurred on south aspects. Here, 60-90 percent of the stands survived through one or more fires. Ponderosa pine old growth occupied about 40 to 60 percent of these warm dry sites.

On north aspects, grand fir habitat types are dominant. Grand fir and Douglas-fir were common cover types, with ponderosa pine and western larch and sometimes Engelmann spruce or lodgepole pine. Pacific yew occurred on lower slopes. Mixed severity fire at frequent intervals (25 to 75 years) was common on north aspects. About 30-60 percent of the stands retained 10 or more trees per acre through at least one fire. Twenty to 30 percent of the stands included at least 10 trees per acre older than 150 years. Ponderosa pine, western larch, Douglas-fir, and grand fir formed the old overstory.

Small to medium blocks (10 to 200 acres) of pole and medium-size fire killed trees were abundant at any time within 10,000 acres of this VRU. Old growth pine and western larch, bunchgrass understories, and rock outcrop are important elements of this landscape. On the VRU as a whole, relative proportion by size class was about 5-20 percent nonforest or nonstocked, 5-30 percent seedling/sapling, 10-20 percent pole, 20-40 percent medium tree, and 20-40 percent large tree.

VRU 3: Changes from historic - With advancing forest succession and fire suppression, ponderosa pine/Douglas-fir forests have declined by 13 percent. Annual grasslands and weedlands have increased. Harvest has resulted in a 128 percent increase in nonforest (nonstocked openings). Forest succession and fire suppression have resulted in a 33 percent decline in seedling and sapling structural stages, an 83 percent decline in pole stages, a 36 percent decrease in medium tree stages and a 6 percent increase in large tree stages. However, more of the large trees are in mixed conifer and less in open pine stands. Harvest has affected about 11 percent of the Forest lands in the subbasin, over 50 years. Today, about 255 acres burn annually in the subbasin, a decline of 70 percent. Prescribed fire on dry south aspects burns an additional 500 to 1,000 acres annually. The ratio of stand replacement harvest to mixed or low severity treatments has been about 60 percent replacement to 34 percent less severe treatments. This is probably within the range of natural variability, but harvest has, until recently, favored removal of the fire tolerant overstory pine and retention of understory Douglas-fir and grand fir, the reverse of fire disturbance effects. This is a higher ratio of stand replacement than would have occurred under natural disturbance regimes. Total canopy cover appears to have declined. Whether this is due to increased mortality from insects and disease or harvest, is uncertain. Extensive snag patches are no longer being created as a result of fire suppression.

VRU 4: Rolling hills, grand fir - This VRU is common in the South Fork at low and mid elevations. Grand fir habitat types are dominant. Grand fir, Douglas-fir, ponderosa pine, and western larch were historically dominant. Lodgepole pine and Engelmann spruce were less common. Mixed and stand replacing fire occurred at moderate intervals. About 50-60 percent of stands originated from stand replacing fire and 40-50 percent experienced mixed and low severity fire. Ponderosa pine, western larch, Douglas-fir, and grand fir often survived mixed severity fires to form a scattered overstory of old large trees. Ten to 25 percent of the stands included at least 10 trees per acre older than 150 years. Small to large blocks (100 to 2,000 acres) of pole to large fire killed trees were common at any time within 10,000 acres of this VRU. Old growth pine and western larch and meadow complexes are important elements of this landscape. Relative proportion by size class was about 5-10 percent nonforest, 5-50 percent seedling/sapling, 10-30 percent pole, 20-30 percent medium tree, and 10-50 percent large tree.

VRU 4: Changes from historic - With advancing forest succession and fire suppression, ponderosa pine/Douglas-fir forests have declined by 32 percent. Lodgepole pine has decreased by 31 percent. Grand fir/Douglas-fir forest has increased by 43 percent. Forest succession and fire suppression have resulted in a 33 percent decline in seedling and sapling structural stages, and a 12 percent decrease in large tree stages. Harvest of the overstory pine has been most concentrated in this VRU, affecting about 29 percent of the Forest acres within the last 50 years. Today, about 5 acres burn annually in the subbasin, a decline of 99 percent. The ratio of stand replacement harvest to mixed or low severity treatments has been about 60 percent replacement to 40 percent less severe treatments. This is slightly more replacement than would have occurred under natural disturbance regimes. This is probably within the range of natural variability, but harvest has, until recently, favored removal of the fire tolerant overstory pine and retention of understory Douglas-fir and grand fir, the reverse of fire disturbance effects. Total canopy cover appears to be about the same. Extensive snag patches are no longer being created as a result of fire suppression.

VRU 5: Moraines, subalpine fir and grand fir - This VRU is rare in the South Fork, at mid to upper elevations. Grand fir and subalpine fir habitat types are dominant. Lodgepole pine and Engelmann spruce are common seral species. Grand fir, Douglas-fir, subalpine fir, and western larch are minor components. Mixed and stand replacing fire occurred at infrequent intervals. About 35 percent of the stands originated from stand replacing fire and 65 percent experienced mixed or low severity fire. Small to large blocks (100 to 2,000 acres) of pole to medium-size fire killed trees occurred occasionally within 10,000 acres of this VRU. In swales, Engelmann spruce-subalpine fir old growth was usually extensive between rare large stand replacing fires. About 10-20 percent of stands included at least 10 trees per acre older than 150 years. Old growth Engelmann spruce-subalpine fir and wetlands are important elements of this landscape. Relative proportion by size class was about 5 percent nonforest (or nonstocked), 10-40 percent seedling/sapling, 20-60 percent pole, 5-30 percent medium tree, and 3-10 percent large tree.

VRU 5: Changes from historic - With advancing forest succession and fire suppression, mixed conifer and Engelmann spruce-subalpine fir forests have increased. It is uncertain if whitebark pine was ever an important component in this area, but it is present now in only very small amounts. Forest succession and fire suppression have resulted in declines in seedling/sapling and pole structural stages, and increases in medium-size and large trees stages. Harvest has affected about 19 percent of the Forest acres within the last 50 years. No acres have burned in the subbasin since fire suppression became effective. The ratio of stand replacement harvest to mixed or low severity treatments has been about 70 percent replacement to 30 percent less severe treatments. This is probably more replacement than would have occurred under natural disturbance regimes. Extensive snag patches are no longer being created as a result of fire suppression.

VRU 6: Cold basins, grand fir and subalpine fir - This VRU is very common in the subbasin, at mid elevations. Grand fir and subalpine fir habitat types are dominant. Lodgepole pine was the dominant seral species. Western larch, Douglas-fir, and Engelmann spruce were important. Grand fir was important on mesic sites. Whitebark pine was historically occasional. Five to 15 percent of stands included at least 10 trees per acre older than 150 years. Medium to large stand replacing fires occurred at infrequent interval (75 to 150 years). About 60-90 percent of the stands originated from stand replacing fire and 10-40 percent experienced mixed severity fire. Moderate to large blocks (500 to 1000 acres) of pole to medium-size fire killed trees were common at any time within 10,000 acres of this VRU. Large disturbances (100s to 10,000s of acres) and meadow complexes were important elements of this landscape. Relative proportion by size class was 5-10 percent nonforest (or nonstocked), 10-30 percent seedling/sapling, 30-45 percent pole, 20-40 percent medium tree, and 5-20 percent large tree.

VRU 6: Changes from historic - With advancing forest succession and fire suppression, lodgepole pine has decreased by 23 percent and more shade tolerant mixed conifer and Engelmann spruce-subalpine fir forests have increased by 30 percent. Whitebark pine has essentially disappeared as even a minor component. Forest succession and fire suppression have resulted in a 53 percent decline in seedling/sapling stages, a 46 percent decline in pole structural stages, and a 32 percent increase in medium tree and a 20 percent increase in large tree stages. Riparian meadows appear to have declined either due to forest encroachment or agricultural conversion. Harvest has affected about 18 percent of the Forest acres within the last 50 years. About 13 acres have burned annually in the subbasin since fire suppression became effective, a decline of about 99 percent. The ratio of stand replacement harvest to mixed or low severity treatments has been about 70 percent replacement to 30 percent less severe treatments. This is probably within the range of what would have occurred under natural disturbance regimes. Extensive snag patches are no longer being created as a result of fire suppression.

VRU 7: Moist uplands, grand fir and Pacific yew - This VRU is common in the subbasin, at mid elevations, but quite rare elsewhere in northern Idaho. Mesic grand fir habitat types are dominant, and Pacific yew phases are common. Grand fir, Douglas-fir, and Pacific yew were the dominant species. Western larch, Engelmann spruce and lodgepole pine are less common. Usually small to medium fires of mixed severity occurred at infrequent intervals (75 to 150 years). Large stand replacing fires occurred more infrequently. About 60 percent of the stands experienced mixed severity fire and about 40 percent originated from stand replacing fire. Small and scattered blocks (5-100 acres) and infrequent large blocks of fire killed medium and large trees occurred occasionally within 10,000 acres of this VRU. Old overstory trees were common and could be grand fir, western larch, Douglas-fir, Engelmann spruce, or lodgepole pine. About 30-40 percent of stands had 10 or more trees per acre older than 150 years. Two or more age classes were common. Pacific yew and mesic old growth were important elements of this landscape. Relative proportion by size class was about 1-10 percent nonforest (or nonstocked), 5-20 percent seedling/sapling, 10-25 percent pole, 25-35 percent medium tree, and 35-45 percent large tree.

VRU 7: Changes from historic - With harvest and planting, Douglas-fir/ponderosa pine forest has increased 107 percent. Upland and riparian shrublands have declined. Forest succession and fire suppression have resulted in a 57 percent decline in seedling/sapling stages, a 45 percent decline in pole structural stages, and a 22 percent increase in large tree stages. Harvest has affected about 28 percent of the Forest acres within the last 50 years. About 5 acres have burned annually in the subbasin since fire suppression became effective, a decline of about 99 percent. The ratio of stand replacement harvest to mixed or low severity treatments has been about 70 percent replacement to 30 percent less severe treatments. This relative proportion of stand replacement is higher than would have occurred under natural disturbance regimes. Snag patches are no longer being created as a result of fire suppression.

VRU 8: Stream breaklands, cedar and grand fir - This VRU is rare in the subbasin and common northward, at low and mid elevations. Moist grand fir and cedar habitat types are dominant. Grand fir and Douglas-fir were the dominant species. Western larch, western redcedar, western white pine, Engelmann spruce, and Pacific yew were less common. Ponderosa pine and lodgepole pine were minor. Small to medium fires occurred at moderate intervals (25-75 years) and large stand replacing fires at infrequent intervals (75 to 150 years). About 40-50 percent of stands experienced mixed severity fire, and 50-60 percent originated from stand replacing fire. Small and scattered blocks (5-100 acres) of fire killed medium-size and large trees were common at any time within 10,000 acres of this VRU, and large blocks (500 to 1000 acres) were occurred from time to time. Old overstory trees were common on ridges and lower slopes. They could be Douglas-fir, western larch, grand fir, or occasionally ponderosa pine. About 10-15 percent of stands had 10 or more trees per acre older than 150 years. Coastal disjunct plant species, early seral tall shrub and hardwood communities, and cedar old growth along major streams were important elements of this landscape. Relative proportion by size class was about 5-20 percent nonforest (or nonstocked), 5-30 percent seedling/sapling, 10-20 percent pole, 30-50 percent medium tree, and 20-30 percent large tree.

VRU 8: Changes from historic - This VRU is poorly represented in the subbasin and only a few trends are indicated. Western white pine has almost disappeared because of blister rust and forest succession. Shrub, hardwood, seedling/sapling, and pole structural stages have probably declined. Medium-size and large tree stages have increased. Harvest has affected 2 percent of the acres. No acres have burned in the subbasin since fire suppression has become effective, a decline of 100 percent. Extensive snag patches are no longer being created as a result of fire suppression.

VRU 9: Glaciated slopes, subalpine fir and whitebark pine - This VRU is rare in the subbasin, at highest elevations, but more common to the south and east. Cold subalpine fir and whitebark pine habitat types are dominant. This was the major stronghold of whitebark pine. Subalpine fir, Engelmann spruce, and lodgepole pine were common. Mixed severity fire occurred at moderate and infrequent intervals (25 to 10 years). About 40-60 percent of the stands experienced mixed severity fire and 40-60 percent originated from stand replacing fire. Small to moderate blocks (50-200 acres) of fire killed trees were common at any one time in 10,000 acres of this VRU. Old whitebark pine or lodgepole pine were common on rock outcrop and open ridges. About 5-15 percent of the stands had 10 or more trees per acre older than 150 years. Whitebark pine and open alpine communities were important elements of this landscape. Relative proportion by size class was 30-40 percent nonforest (or nonstocked), 10-30 percent seedling/sapling, 15-60 percent pole, 1-10 percent medium tree, and 1 percent or less large tree.

VRU 9: Changes from historic - Some conclusions are based on limited data from neighboring watersheds. Anecdotal information suggests that similar changes have occurred in the subbasin. With advancing forest succession, fire suppression, and blister rust, whitebark pine has declined by 69 percent, and more shade tolerant Engelmann spruce-subalpine fir forests have increased by 190 percent. Today, only about 12 acres burn per year in the subbasin, a 90 percent decrease. Advancing forest succession has resulted in a 62 percent reduction in seedling/sapling structural stages, 72 percent decline in pole stages, and a 4200 percent increase in medium tree stages. No recorded harvest has occurred. Snag patches are no longer being created as a result of fire suppression, but whitebark pine snags are much more abundant.

VRU 10: Uplands, alder, grand fir and subalpine fir habitat types - This VRU is common in the South Fork, but rare to the south. It is also called the grand fir mosaic. Mesic grand fir, subalpine fir, and alder habitat types are dominant. Grand fir, Engelmann spruce, subalpine fir, and Sitka alder were historically important cover types. Douglas-fir, western larch, lodgepole pine, and Pacific yew were common on ridges. Small fires occurred frequently, but mixed severity infrequent fire was typical, with stand replacement usually confined to ridges. About 40-60 percent of the stands experienced mixed severity fire and 40-60 percent originated from stand replacing fire. Small blocks (5-50 acres) of fire-killed medium-size and large trees were common at any one time in 10,000 acres of this VRU. About 15-30 percent of the stands had 10 or more trees per acre older than 150 years. Open canopied and multi-aged old growth and tall shrub communities were important elements of this landscape. Relative proportion by size class was 10-25 percent nonforest, 15-25 percent seedling/sapling, 20-30 percent pole, 25-40 percent medium tree, and 15-25 percent large tree.

VRU 10: Changes from historic - With forest succession and fire suppression, shrublands have declined 77 percent. Other changes in cover type have been minor. Forest succession and fire suppression have resulted in a 91 percent decline in seedling/sapling stages, a 63 percent decline in pole structural stages, a 25 percent increase in medium tree stages, and a 147 percent increase in large tree stages. Harvest has affected about 4 percent of the Forest acres within the last 50 years. About 2 acres have burned annually since fire suppression became effective, a decline of about 99 percent. The ratio of stand replacement harvest to mixed or low severity treatments has been about 80 percent replacement to 20 percent less severe treatments. This relative proportion of stand replacement is higher than what would have occurred under natural disturbance regimes. Snag patches are no longer being created as a result of fire suppression.

VRU 12: Stream breaklands, bunchgrass and shrublands - This VRU is rare on National Forest lands in the subbasin, but is common in the lower canyon on private lands. Bluebunch wheatgrass and Idaho fescue habitat types are dominant. Shrubland habitat types are common. Bluebunch wheatgrass and Idaho fescue were historically important. Shrublands occupied draws or lower slopes. Very frequent (5-25 years) low severity fire maintained open grasslands and rejuvenated shrublands.

VRU 12: Changes from historic - This VRU is poorly represented on Forest lands. On all lands, only general trends are indicated. Disturbed grasslands (annuals and weeds) and pasture have replaced native perennials over more than 50 percent of their prior extent. Upland shrublands have increased as much as 100 percent due to fire suppression and brush invasions of former grasslands. About 2 acres have burned annually on National Forest lands in the subbasin since fire suppression became effective, a decline of about 82 percent.

VRU 16: Plateaus, bunchgrass and shrubland habitat types - This VRU occurs only on non-National Forest lands. Bluebunch wheatgrass, Idaho fescue and shrubland habitat types are common. Bluebunch wheatgrass and Idaho fescue were historically important. Shrublands occupied draws, lower slopes, and north aspects. Very frequent (5-25 years) low severity fire maintained open grasslands and rejuvenated shrublands.

VRU 16: Changes from historic - On all lands, only general trends are indicated. Annual cropland has replaced native perennials over more than 80 percent of their prior extent. Hayland and pasture have largely replaced the remaining native prairie. Upland shrublands have probably also decreased. Fire incidence has certainly declined, but to what extent is unknown.

VRU 17: Rolling hills, cedar and grand fir - This VRU is rare in the South Fork. Mesic grand fir and western redcedar habitat types are dominant. Grand fir and Douglas-fir were historically important cover types. Western redcedar, western white pine, western larch, Engelmann spruce, and ponderosa pine were less common. Small fires occurred frequently, but mixed severity infrequent (75 to 150 years) fire was typical. About 40-60 percent of the stands originated from mixed severity fire and 40-60 percent from stand replacing fire. Moderate sized blocks (50-500 acres) of fire killed medium-size and large trees were common at any one time in 10,000 acres of this VRU. About 20-35 percent of the stands had 10 or more trees per acre older than 150 years. Ridge top groves of large old cedar and grand fir old growth and early seral tall shrub communities were important elements of this landscape. Relative proportion by size class was 10-25 percent nonforest, 15-25 percent seedling/sapling, 20-30 percent pole, 20-35 percent medium tree, and 15-40 percent large tree.

VRU 17: Changes from historic - This VRU is poorly represented in the subbasin and only a few trends are indicated. Western white pine has virtually disappeared due to blister rust and forest succession. Shrub, hardwood, seedling/sapling, and pole structural stages have probably declined. Medium-size and large tree stages have increased, but numbers of the largest old trees may have been reduced by harvest. Harvest has affected 11 percent of the acres. The ratio of replacement treatment to less severe treatments has been about 100 percent replacement. This is well above the historic ratio. No acres have burned in the subbasin since fire suppression has become effective, a decline of 100 percent. Extensive snag patches are no longer being created as a result of fire suppression.

Summary of Vegetation Conditions

The summary of vegetation conditions can best be addressed by identifying the ecological processes that have most changed: alteration of terrestrial disturbance regimes and introduction of nonnative species.

Fire suppression has resulted in more advanced successional states in the subbasin. This is shown by increases in medium and large tree classes in most settings, and reductions in young tree classes and shrublands or montane parkland. Shade tolerant species like grand fir and subalpine fir have increased, while early seral species like lodgepole pine, ponderosa pine, and whitebark pine have decreased. Stand densities have probably increased over historic in some settings (VRU 3 and 4) with consequent increased risk of insect and disease activity and more severe fire. Old growth is probably more abundant than historically, basin-wide, but has declined in ponderosa pine types and increased in mixed conifer and spruce-fir types. In moist grand fir settings (VRU 7 and 10), some fragmentation and isolation of old growth has occurred.

Timber harvest has not replicated the frequency, scale, or kind of historic disturbance. Across watersheds, vegetation conditions are more uniform. Within stands, vegetation structure has been simplified through clearcutting and removal of fire tolerant ponderosa pine and larch. Heterogeneity of disturbance size and stand structure have been lost in many harvested areas. Harvest and fire suppression have resulted in loss of large patches of fire-killed trees, and large snags of long lasting species like larch.

The introduction of nonnative species has highly altered grassland steppe communities. Annual grasses and noxious weeds are well established at low elevations. Fire behavior and soil productivity may change in response to these altered plant communities.

The introduction of blister rust has affected western whitepine and whitebark pine. Neither species probably ever played a major role in the subbasin, but whitebark pine was common on high elevation sites and incidental down to about 6000 feet elevation.

Wildlife

Overview

The South Fork Clearwater River Subbasin provides habitat for approximately 190 birds, 61 mammals, 8 reptiles, and 6 amphibians (Groves et al. 1997). Some species, such as yellow warbler, striped skunk, western terrestrial garter snake, and western toad can be found throughout the subbasin. Most however, are primarily associated with either the Camas Prairie or coniferous forest.

Historically, the Camas Prairie was dominated by broad expanses of bluebunch wheatgrass and Idaho fescue, supporting both mule deer and elk. Other large herbivores like bison and pronghorn were rare or absent (Holecheck et al. 1995, J. Peek University of Idaho Researcher personal communication). Many of the species historically associated with the Camas Prairie, such as sharp-tailed grouse and burrowing owl, are now extirpated (Burleigh 1972).

The subbasin's coniferous forest varies from warm, low-elevation ponderosa pine, to cold, high-elevation whitebark pine. Similar coniferous forest abuts the subbasin to the north, east, and south, although there are subtle differences that affect wildlife. For example, white-headed woodpecker are uncommon to the south of the subbasin, rare vagrants in the subbasin, and absent to the north. This distribution follows that of very dry, open ponderosa pine forest.

The remainder of this discussion will focus on coniferous forest, as that is the major plant community found on the Nez Perce National Forest. Except where otherwise noted, reference to South Fork Subbasin is specific to that portion administered by the Nez Perce National Forest.

Species Selected for Analysis

One of the key question's for this assessment was "what wildlife habitats should we manage for?". To answer, we first had to decide which wildlife species were most important. In order to prioritize wildlife species, a fine-filter screening process was used to supplement the coarse-filter analysis described above (See discussion in <u>Vegetation</u>). Screening was done by asking the following questions:

1) What subbasin wildlife species have declined since historical times? Can the Nez Perce National Forest play a meaningful role in these species' conservation?

2) Are there subbasin wildlife species that we have special interest in, such as threatened, endangered, sensitive, and game species? Can the Nez Perce National Forest play a meaningful role in conservation of these species?

This process identified 79 species, which were then grouped into five broad guilds, including:

- Ponderosa Pine Dependent Species.
- Early Forest Sere Dependent Species (i.e. those closely associated with the first steps of forest succession, such as post-fire, grass, forb, and brush habitats).
- Late Forest Sere Dependent Species (such as those associated with old growth forest).
- Riparian Associated Species.
- Security Dependent Species

Guild representatives were then chosen for in-depth analysis, based on the extent of each species' decline from historical times. Analysis of riparian associated species is tiered to the aquatic analysis presented above, and is summarized in the Wildlife Technical Report. The analysis of guild representatives for Ponderosa Pine Dependent Species, Early Forest Sere Dependent Species, Late Forest Sere Dependent Species, and Security Dependent Species is summarized in the discussion that follows. Additional information is available in the Wildlife Technical Report.

Analysis Methods

To characterize the status of subbasin wildlife habitat, high-quality habitat was mapped for each guild representative. High-quality habitat was defined differently for each species. For example, based on local research, high-quality habitat for flammulated owls was defined as ponderosa pine forest greater than 80 years old, with canopy closures less than 70%. Maintaining, improving, and expanding this habitat was assumed to be the management strategy most likely to perpetuate flammulated owls.

Once high-quality habitat was mapped, several questions were posed, such as:

- How does the current amount and distribution of high-quality habitat compare to historic conditions?
- What are the implications of differences between existing and historic conditions?

  NOTE: as a rule-of-thumb, whenever an existing habitat totaled less than 60% of its historical extent, it was considered a management concern. Whenever an existing habitat totaled less than 40% of its historical extent, it was considered to be of high management priority.
- Is the current quantity, quality, and distribution of existing habitat adequate to perpetuate the species?

Flammulated owl and white-headed woodpecker were selected as guild representatives for ponderosa pine dependent species. Both prefer open-grown, fire-climax forest. Preferred habitat for these two species overlap considerably. In general, habitat management which benefits flammulated owls, benefits white-headed woodpeckers. Although rare, flammulated owl are known to regularly occur in the subbasin. White-headed woodpeckers do not. Because of these reasons, flammulated owl was considered the more critical species for analysis, and is the focus of the following discussion. Additional information on white-headed woodpecker is available in the Wildlife Technical report.

Flammulated Owl

Habitat Needs - Flammulated owl habitat is characterized by open-grown, fire-climax, old growth ponderosa pine or Douglas-fir forest. Such habitat is likely preferred because it offers both suitable nesting cavities (usually excavated by northern flickers or pileated woodpeckers) and highly available prey, such as moths, grasshoppers, and beetles.

Status - Flammulated owl are classified as a sensitive species on the Nez Perce National Forest, and as a Species of Special Concern by the Idaho Department of Fish and Game. Surveys have been conducted for flammulated owls in South Fork Canyon, Meadow Creek, Mill Creek, and Silver Creek ERU's. Flammulated owl presence has only been verified in the Granite Creek drainage (Cougar-Peasley ERU). Owls have not been recorded elsewhere, in seemingly suitable habitat. This "clumped" distribution is typical for the species (McCallum 1995), and has important conservation implications (See Below).

Existing and Historical Habitat - Approximately 17,000 acres of high-quality flammulated owl habitat is currently available in the subbasin, representing an estimated 61% of the historical habitat, but only half of this acreage likely retains the open understory characteristic of fire-climax forest. Current habitat is concentrated along the river corridor.

Conservation Needs - Flammulated owls should be a management priority for the subbasin. Habitat management should focus on restoring fire-climax ponderosa pine forest. Desired structure should consist of small grass openings within mature or older ponderosa and Douglas-fir forest, with greater than 2 conifer canopies, approximately 50% overhead canopy closure, and a varied understory of shrubs and grasses. Treatment efforts should focus on the western 3/4's of South Fork Canyon ERU, as well as on the lower ends of Meadow Creek, Peasley-Cougar, Johns Creek, and Mill Creek ERUs. Of all of the wildlife species discussed in this document, presence/absence surveys are the most critical for flammulated owls, due to the bird's apparent clumped distribution. Such surveys should be conducted whenever removal of large diameter trees in mature or older ponderosa pine forest types is proposed. Inadvertent harvest of an occupied timber stand might extirpate the species from a larger area.

Early Seral Dependent Species

Wildlife associated with early seral habitat include black-backed woodpecker, lynx, and elk. Gray wolves, which prey on elk, and bald eagles, which feed on elk and deer carrion, are both indirectly dependent on early seral habitat, and so are discussed in this section.

Black-backed Woodpecker

Habitat Needs - Black-backed woodpeckers are dependent on large areas with numerous dead or dying trees infected with bark and wood-boring beetles. The beetle larvae are the woodpecker's major food source (DeGraaf et al. 1991). Mature to old growth lodgepole pine forest is often used by black-backed woodpeckers. The most preferred habitat however, is recently burned forest.

Status - A sensitive species, black-backed woodpecker occur throughout northern Idaho, where they are uncommon to rare (Burleigh 1972). Although surveys have been conducted in the Peasley-Cougar, Meadow, Mill, and South Fork Canyon ERUs, no black-backed woodpeckers have been documented. This species is typically quiet and inconspicuous however, and often goes unnoticed. The closely related, and ecologically similar three-toed woodpecker has been observed several times. The two species are often found in the same general area. The known presence of black-backed woodpeckers in the Lochsa and Salmon Subbasins, as well as on the Clearwater, Payette, and Bitterroot National Forests suggests that black-backed woodpeckers are likely resident within the subbasin in low numbers.

Existing and Historical Conditions - Between 1870-1940, an average of 12,700 acres of recently burned forest would have been available to black-backed woodpeckers at any one time. Currently, no such habitat is available, a loss of 100%. Non-burned black-backed woodpecker habitat has also declined from historical levels but to a lesser degree (30% decline). Overall, black-backed woodpeckers have seen the greatest decline in high-quality habitat of any wildlife species.

Conservation Needs - Black-backed woodpeckers would benefit by creation of large patches of fire-killed trees. Such actions should be a high management priority, due to the extent of decline from historical conditions. Under current management direction, fire-killed trees are typically salvage logged. Resource management guidelines aimed at integrating salvage logging in recently burned forest with black-backed woodpecker habitat needs and safety concerns have been developed by the adjacent Payette National Forest. These guidelines should be considered for adoption for use within the subbasin. Black-backed woodpecker management should be especially emphasized in American River, Crooked River, Johns Creek, and Red River ERUs, as these are the areas with the most biologic potential for this species

Lynx

Habitat Needs - In Idaho, lynx are most often found in areas above 4,000 feet in elevation, in Engelmann spruce/subalpine fir forest (Koehler and Brittell 1990). Important habitat features include den sites and foraging habitat. Den sites are typically located in hollow logs or rootwads within mesic, mature or old growth coniferous forest (Koehler and Brittell 1990). Lynx foraging habitat corresponds with snowshoe hare habitat, as the hare is the lynx's favored prey. Snowshoe hare are most abundant in seedling/sapling lodgepole pine, subalpine fir, and Engelmann spruce forest stands.

Status - Lynx are rare in northern Idaho, but have twice been recorded in the subbasin. One lynx was trapped at Earthquake Basin in 1991 in atypical habitat, and another was seen at Lightning Creek. The species is considered a sensitive species by the Forest Service (Region 1), and was recently classified as a "Category 3 species" by the US Fish and Wildlife Service, meaning that listing under the Endangered Species Act may be warranted. The US Fish and Wildlife Service has recently announced its intent to list the lynx under ESA. Lynx surveys have been conducted in the Red River ERU, but have not documented the species' presence.

Existing and Historical Conditions - Lynx denning habitat is abundant and well distributed throughout the upper elevations of the subbasin. Foraging habitat however, is limited, and disjunct, being concentrated in two patches, one in upper Johns Creek (within the Gospel-Hump Wilderness) and the other in Red River ERU.

Conservation Needs - Because lynx require both old growth forest (for denning) and seedling/sapling forest (for foraging), a mosaic of forest ages must be provided. In the subbasin, the most limiting feature is believed to be the amount and distribution of high-elevation, early-seral forest. Additional early seral habitat could be created by burning or timber harvest. Approximately 30% of lynx habitat should be in early seral conditions at any one time. The ERUs most suitable for lynx management are Johns Creek, American River, Crooked River, and Red River. Currently, less than 30% of suitable lynx habitat in Johns Creek and Red River ERUs are in early seral conditions.

Bald Eagle

Habitat Needs - Bald eagle habitat requirements change throughout the year. This discussion will focus on winter habitat requirements because there are no known nesting sites in the subbasin. Bald eagle winter habitat is a function of perch and roost site availability, foraging habitat quality, and, in some cases, human disturbance (Montana Bald Eagle Working Group 1990). Perch and roost site availability and human disturbance levels are not considered limiting factors for subbasin bald eagles. The factor that is considered most limiting is the availability of big game carrion.

Status - Bald eagle were classified as endangered in 1973, but were downlisted to threatened in 1995. The subbasin is part of Bald Eagle Recovery Zone 15, which encompasses all of central Idaho. Recovery goals for Zone 15 are to provide secure habitat for at least six bald eagle nesting territories, with long-term occupation of at least four. This goal has been exceeded every year since 1990 (B. Kibler, US Fish and Wildlife Service Biologist pers. comm.). No bald eagles currently nest within the subbasin, and no historical nests are known of. During most recent winters (December-February), a few bald eagles have been seen on the Camas Prairie, as well as along the South Fork Clearwater River. An annual survey for bald eagles is conducted along Highway 14, from Elk City to Harpster, Idaho. Most of the eagles detected have been found along the river stretch from Mill Creek to Lightning Creek at the Forest boundary. Bald eagles have also been seen during other times of year and in other places, but their presence is less predictable.

Existing and Historical Conditions - Although subbasin bald eagle habitat quantity has not changed much over the last century, habitat quality likely has. Before 1911, bald eagles wintering along the South Fork Clearwater River fed on chinook salmon as well as big game carrion. Availability of big game carrion would have peaked in the late 1950's, along with the size of local elk herds. (Leege 1984). In recent decades, big game carrion has likely declined, along with elk and deer numbers (Leege 1984).

Conservation Needs - For subbasin bald eagles, increasing and maintaining early seral habitat on big game winter range should be the highest priority (See Elk discussion for additional details). To be most effective, such efforts should be concentrated in the South Fork ERU, particularly from Mill Creek to Lightening Creek.

Gray Wolf

Habitat Needs - Quality wolf habitat is characterized by quality big game habitat (T.Koch USDI Fish and Wildlife Service Wolf Biologist pers. comm.).

Status - Gray wolf were historically present in the subbasin, but were largely extirpated by the 1930s (Hanson 1986). Incidental wolf reports were recorded throughout the 1970s and 1980s, although no wolf reproduction or resident wolf presence was documented. In 1995, gray wolves were reintroduced into Central Idaho, approximately 100 miles south of the subbasin. As part of the reintroduction effort, all wolves in Central Idaho were classified as "experimental - nonessential" under provision 10J of the Endangered Species Act. Gray Wolf surveys have been conducted in the Meadow Creek, Cougar-Peasley Creek, Red River, Johns Creek, and Mill Creek ERUs. No confirmed responses have been recorded.

Existing and Historical Conditions - The subbasin is occupied by deer, elk, moose, and mountain goat, and contains high quality habitat for elk and deer. Mesic meadows (favored wolf denning and rendezvous sites) are also available. Based on these facts, the subbasin is considered good quality wolf habitat. Wolf habitat quality is further enhanced by the proximity of large areas with no roads, including the Gospel Hump Wilderness, the Selway Bitterroot Wilderness, and Johns Creek. These areas have relatively low human disturbance. Although isolation from human disturbance is not as important to wolf management as once thought (USDI Fish and Wildlife Service 1993b), it is a factor in maintaining high quality big game habitat and reducing the risk of incidental wolf mortality.

Conservation Needs - Management for gray wolves focuses on reducing incidental wolf mortalities (from shooting, poisoning, etc.), protecting wolf den and rendezvous sites from disturbance while in use by wolves, and improving big game habitat. The Nez Perce National Forest will continue to coordinate closely with the USDI Fish and Wildlife Service and Nez Perce Tribe regarding wolf management objectives. The most effective habitat management strategy is to increase big game populations, by continued maintenance and improvement in elk winter range (See following ELK discussion for details).

Elk

Habitat Needs - Elk habitat requirements change throughout the year (Leege 1984). The limiting factors for subbasin elk are the availability of wildlife security during hunting season, and availability of forage on winter range. The status of wildlife security in the subbasin is detailed below (See Security Dependent Species). This discussion will focus on winter forage availability. Although habitat recommendations vary, approximately 40-60% of elk winter range should contain extensive winter browse, in the form of grasses, forbs, and deciduous shrubs. In addition, 10-20% of the area should provide winter thermal cover, defined as coniferous forest greater than 40 feet tall with greater than 70% canopy cover.

Status - Elk are designated as a management indicator species on the Nez Perce National Forest due to their popularity as a game animal. The species is common and widespread throughout the subbasin and is surveyed annually by the Idaho Fish and Game.

Existing and Historical Conditions - Historically, elk were likely widespread but uncommon in the subbasin's coniferous forest (Leege 1984). Local elk populations benefited from large fire events in the late 1800' and early 1900's. Forest succession on elk winter range since the 1950s has reduced habitat quality.

Conservation Needs - The most important conservation need for subbasin wintering elk is providing improved quantity and quality of winter and early spring browse. The most heavily used subbasin winter ranges occur in the South Fork Canyon, Newsome-Leggett Creek, and Red River ERUs. Increased timber harvest and prescribed burning in these areas should be emphasized. Reforestation prescriptions need to provide for a prolonged (20 year) period of early seral, deciduous brush habitat. The goal should be to have at least 40% of elk winter range dominated by grass/forb/shrub seres at any one time.

Late Seral Dependent Species

Fisher, American marten, moose, Northern goshawk, and pileated woodpecker are all at least partially reliant on late seral habitat. Fisher and American marten have overlapping habitat requirements, and so are discussed together.

Fisher and American Marten

Habitat Needs - On the Nez Perce National Forest, fisher and marten both inhabit mesic, coniferous forest, although marten are typically found in high-elevation forests between 4,500 feet and treeline, while fisher are generally found between 3,500-6,000 feet. Both species prefer structurally complex habitat, with multiple canopy layers and abundant down woody debris and understory shrubs (Idaho State Conservation Effort 1995). Favored prey items are predominantly small and medium sized mammals and birds, and include snowshoe hare, red-backed and meadow voles, Northern flying squirrel, and red squirrel (Idaho State Conservation Effort 1995).

Status - Both fisher and American marten are management indicator species for the Nez Perce National Forest, but fisher are also listed as sensitive. Both species have been recorded throughout the subbasin. Track and camera surveys targeting these species have been conducted in Meadow Creek and Red River ERUs.

Existing and Historical Conditions - Approximately 126,000 acres of high-quality fisher habitat is currently available within the subbasin, comprising 188% of the amount likely available historically. Approximately 90,000 acres of high-quality marten habitat is currently available within the subbasin, comprising 208% of the amount likely available historically.

Conservation Needs - The ERUs that are most suitable for joint fisher and American marten management are Wing-20 Mile Creek, Peasley-Cougar Creek, American River, Newsome-Leggett, Silver Creek, and Meadow Creek. These areas should be managed to provide extensive mature or old growth mesic forest. Newsome-Leggett ERU is the only one that does not currently meet this criteria (See Chapter 4).

Goshawk

Habitat Needs - In Idaho, Northern goshawk are typically found in montane coniferous forest, where they inhabit a 5,000 acre home range, including a 25 acre nesting territory. Mature to old growth timber is favored for nesting.

Status - Goshawk are generally uncommon to rare throughout northern Idaho (Burleigh 1972), but have been recorded across the Nez Perce National Forest. Both intensive and extensive goshawk surveys have been conducted in the subbasin.

Existing and Historical Conditions - Closed canopy old growth (high-quality goshawk nesting habitat) comprises 24% of the subbasin coniferous forest. Historically, such habitat would have likely encompassed 15% of the same area.

Conservation Needs - Maintaining or restoring closed canopy old growth forest should be a priority for goshawk management. Preferred stands are dominated by Douglas-fir and western larch, have overhead canopy closures greater than 60%, are at least 120 years old, encompass greater than 150 acres, and have less than 45% slope. Optimally, two such stands would be provided for every 10,000 acres (Hayward 1990). Although the majority of the subbasin is capable of supporting goshawk, the highest biologic potential (based on existing habitat types, forest types, and landtypes) is in South Fork Canyon, American River, Red River, Newsome-Leggett, Meadow Creek, and Crooked River ERUs. Goshawk management should be stressed in these areas.

Pileated Woodpecker

Habitat Needs - In northern Idaho, pileated woodpeckers are most commonly found in mature to old growth coniferous forests that have numerous, large dead or dying trees. The bulk of the pileated's diet is comprised of carpenter ants and wood-boring beetles. Favored feeding sites include snags and stressed live trees over 12" dbh, stumps, and down logs. The most critical feature however, is the availability of nesting sites. Suitable nest trees are typically infected with heart rot, and are greater than 20" dbh (Aney and McClelland 1990).

Status - Pileated woodpeckers are classified as an old growth management indicator species by the Nez Perce National Forest. Pileated woodpeckers are commonly heard and seen throughout the subbasin's coniferous forest. Presence/absence surveys have been conducted in Meadow Creek and Cougar-Peasley Creek ERUs. Population monitoring surveys have been run intermittently near Green Creek Point (South Fork Canyon ERU) since 1989. Although this survey's sample size is very small (average n = 4 birds), it suggests that pileated numbers have been relatively stable in that area.

Existing and Historical Conditions - Currently, high-quality pileated woodpecker habitat is abundant and well distributed within the western half of the subbasin's coniferous forest. Pileated woodpecker habitat is more limited in the eastern half, due to the preponderance of lodgepole pine, a non-preferred forest type. Pileated habitat has increased over historical conditions due to fire exclusion.

Conservation Needs - Habitat management for pileated woodpeckers focuses on providing large (greater than 20" dbh) diseased and dead trees. The ERUs most suitable for pileated woodpeckers are South Fork Canyon, Meadow Creek, Peasley-Cougar, American River, Johns Creek. Land management in these areas should focus on providing both suitable foraging and nesting habitat in the form of overmature to old growth timber. In general, at least 600 acres of overmature or old growth forest should be maintained per 2,500 acre area (i.e. 24% of the area). Currently, all of the ERUs listed above exceed these guidelines.

Moose

Habitat Needs - Based on local research, favored moose foraging areas include lakes, creeks, mesic meadows, 5-40 year old timber harvest units, and burned forest (Pierce and Peek 1984). Favored browse species utilized year-round include willow, fool's huckleberry, mountain maple, serviceberry and Pacific yew (Pierce and Peek 1984). The most limiting habitat feature for subbasin moose is the availability of high-quality winter range. Such habitat is characterized by mature to old growth grand fir, especially stands with an understory of Pacific yew, a highly preferred browse species.

Status - Moose are common within the Clearwater River drainage, including the subbasin (Larrison and Johnson 1981). Moose research was conducted within the subbasin, 1978-1982 (Pierce and Peek 1984).

Existing and Historical Conditions - Approximately 102,000 acres of high-quality moose winter habitat is available within the subbasin, and is likely more than double what would have been available historically. This increase in habitat is due to fire suppression.

Conservation Needs - Conservation of old growth grand fir/Pacific yew forest is the most important habitat management strategy for subbasin moose.

Security Dependent Species

Several wildlife species prefer areas isolated from high levels of human activity. Most such species are either hunted or trapped. In the South Fork Clearwater Basin, elk, gray wolf, marten, fisher, wolverine, and lynx are all more likely to use secluded areas than disturbed ones. The sensitivity of each species varies widely however, and even varies between individuals. The type, amount, duration, and season of disturbance affect the ultimate impact of human activity on wildlife populations. Due to the complexity of the issue, two guild representatives were chosen for analysis: big game (represented by elk), and furbearers (represented by American marten and fisher).

Big Game Habitat Needs - Elk are most sensitive to human disturbance during calving season (mid-May to mid-June), hunting season (late August to late October), and winter (especially January to March). In general, at least 20% of an area should provide "wildlife security", defined as areas larger than 250 acres that are more than 0.5 mile from an open road (Leege 1984).

Furbearers Habitat Needs - Management guidelines have also been developed for American marten and fisher habitats (Idaho State Conservation Efforts 1995). In areas where trapping is allowed (such as the South Fork Clearwater Basin), it is recommended that at least 30-40% of each ERU should have less than 0.25 mile of open road per square mile. As defined here, open roads are those that allow motorized travel during the trapping season (November-January).

Big Game Existing and Historical Conditions - In order to assess the overall quality of wildlife security habitat for elk, the Summer Elk Habitat Model (Leege 1984) was used. This model assigns an Elk Habitat Effectiveness (EHE) score between 0 and 1, where 1 is optimum elk habitat. Several habitat variables, including open road density, livestock density, and availability of cover are used in model calculations. Whenever a given habitat variable is not at optimum levels, "points" are subtracted from the overall model score. In general, the most important variable has been the availability of wildlife security and the density of open roads. In 1987, the Nez Perce National Forest drafted its elk management plan with input from the Idaho Department of Fish and Game. In that plan, the forest showed how it would help maintain the required forest-wide EHE by setting EHE goals by Elk Habitat Units (EHU). EHU are typically around 5,000 acres in size. The South Fork Subbasin contains 75 EHUs. Eight of these EHUs (11% of the total) are 5 or more points below their EHE goal, while 42 (56% of the total) are 5 or more points above. The eight EHUs below their goal are concentrated in Red River ERU, Mill Creek ERU, and Meadow Creek ERU.

Furbearers Existing and Historical Conditions - As noted above, the ERUs most suitable for fisher and American marten management are American River, Newsome-Leggett, Silver Creek, and Meadow Creek. All of these areas currently have less than 5% of their area with less than 0.25 mile of open road per square mile.

Conservation Needs - In general, wildlife security availability in the subbasin is sufficient for elk, although localized problems occur, especially in Red River ERU, Mill Creek ERU, and Meadow Creek ERU. Habitat suitability in these areas for disturbance-sensitive species should be the focus of a more intensive analysis whenever management activities are proposed. None of the areas that are proposed for furbearer management meet habitat guidelines regarding trapping access. However, according to the Idaho Fish and Game harvest records, little trapping occurs in the South Fork Clearwater Subbasin. In 1995 for example, 5 American martens were trapped in Idaho County. Idaho County is the state's largest, encompassing 5.4 million acres, including all of the subbasin. Even if all 5 animals were trapped in the subbasin, trapping mortality is unlikely to be a limiting factor for local marten populations. Trapping mortality on fisher has also been low in the 1990's, averaging 1 per year. Because of these low mortality levels, additional restrictions on motorized access during the trapping season is not recommended. The establishment of new loop roads open during the trapping season in Silver Creek, American River, Newsome-Leggett, and Meadow Creek ERUs however, should be discouraged.

Summary of Wildlife Conditions

Exclusion of fire as an integral forest process has significantly changed wildlife habitat conditions which once resulted from varying fire intensities and intervals. Lack of areas with fire-killed or weakened trees has impacted the black-backed woodpecker and other snag-dependent species. Absence of the tree thinning effects of ground fires have allowed shade-tolerant tree species to crowd out important forage plants and compete for moisture and nutrients, discouraging the growth of large trees and maintenance of old growth conditions in some. Replacement and elimination of old structure ponderosa pine by successional advancement, harvest and stand replacing fire has reduced habitats important to flammulated owls and white-headed woodpeckers. In addition, important early seral habitats at both low and higher elevations once a product of fire's influences have since failed to maintain these conditions important as winter foraging habitats for elk as well as habitat mosaics at higher elevations important to lynx. Harvest of commercially valuable early seral species (i.e. ponderosa pine, larch), has contributed to fire's influence in reducing these tree species role on the landscape and in replacing these important habitat components by other species.

In some moist grand fir settings, fragmentation and isolation of tracts of old-growth have occurred which have impacted species such as fisher and pine marten to some degree. Though availability of late seral habitats has generally increased at the higher elevations, in some moist grand fir and Douglas fir settings, harvest patterns have resulted in moderate fragmentation and some isolation of old growth important to fishers, pine marten and goshawk.

Hunted and trapped species including the guild representatives elk, fisher and pine marten are considered sensitive to human-induced disturbance or are at risk from potential trapping via high density road and trail networks in some areas.

Unique Habitats and Elements

Research Natural Areas

Research Natural Areas (RNAs) are part of a national network of ecological areas designated in perpetuity for research and education and/or to maintain biological diversity on National Forest System lands. RNAs are defined as a physical or biological unit in which current natural conditions are maintained allowing natural physical and biological processes to prevail. A major objective of the RNA program is to maintain a representative array of all significant ecosystems as baseline areas for research and monitoring. Regional assignments were made in 1983 to insure coverage of the vegetative features important to the RNA system. Proposed RNAs in the subbasin are shown in Map 3.

Square Mountain Creek proposed RNA - This 709 acre area was recommended to protect the type locality of a rare subalpine plant, *Douglasia idahoensis* (Idaho douglasia). Six subalpine habitats occur here. The area also has complex geology and it encompasses a well developed aquatic system. The proposed RNA is located entirely within the Gospel Hump Wilderness.

Upper Newsome Creek proposed RNA - This 1,185 acre area was recommended to preserve old-growth grand fir - Pacific yew plant communities. Other vegetative examples from the Northern Region Guide are also included in this area.

Unique Elements

Throughout the subbasin, there are unique and/or special features, habitats or elements that warrant discussion and consideration. They are listed below.

Fens - They are wet areas that support plant species like cottongrass and sundew that require acid organic soils and high water tables. These communities are vulnerable to activities that alter hydrologic regimes or soil acid, encourage conifer encroachment, or directly impact the areas through excavation or trampling. Fens occur in Sing Lee and Pilot Creek in the Newsome-Leggett ERU.

Streamside meadows - Most streamside meadows are dominated by mesic grasses, rushes, sedges, and forbs requiring wet conditions. These habitats add diversity to the surrounding expanse of coniferous forest. Common snipe, Lincoln's sparrow, spotted frog, and moose are all associated with montane meadows. Typical examples of this habitat include Buck Meadows, American Meadows, Mill Creek Meadows, Twenty-mile Meadows, and Table Meadows. Others occur in almost all ERUs. Both too much disturbance (such as from excessive grazing) or too little disturbance (such as the complete absence of fire for several decades) threaten the viability of these habitats.

Rocky Mountain juniper - This plant occurs in Upper Johns Creek ERU on steep south facing slopes. They are susceptible to fire or conifer encroachment. Low severity fire might be important in their long term persistence, but severe fire could eliminate them from these isolated areas.

Mountain mahogany - This small community is an isolated remnant in the South Fork Canyon ERU. These shrubs are highly sensitive to fire and are usually only found in rocky areas where fuels are light or where they can regenerate from seed after fire. They are subject to encroachment from adjacent forested areas and may require some fire to provide seed beds. Site specific inventory of extent and condition is needed.

Idaho douglasia - This alpine mat-forming plant is rare (found only in central Idaho), and limited to high elevation open gravelly ridges. It occurs in Johns Creek and Tenmile ERU. The species has evolved with a natural high-elevation fire regime (fires occurring in July-September).

Bank monkey-flower - This annual species occurs in South Fork Canyon ERU from Meadow Creek to Elk City. It grows on steep open slopes in open ponderosa pine or Douglas-fir stands, and depends on some soil trampling by ungulates to provide moist microsites for germination. It is probably sensitive to spring fire when it is blooming (May to June), but typically grows in areas with very low fuels.

Candystick - This distinctive non-chorophyllous species is a coastal disjunct, occurring in South Fork Canyon ERU. It requires both a conifer host (typically lodgepole pine) and a mycorrhizal fungus for establishment. Because it occurs predominantly in fire-dependent lodgepole pine stands, it appears adapted to, and perhaps dependent on, fire. The South Fork Clearwater populations occur in mature lodgepole pine stands with grand fir regeneration underneath, which may indicate that fire restoration would be beneficial.

Clustered ladyslipper - This orchid species occurs in the South Fork Canyon ERU, in grand fir/Pacific yew and ponderosa pine with Douglas-fir regeneration. The common element to both is a late-seral stand structure. A closed canopy understory with approximately 60 percent shade and very sparse forb layer is optimal. A mycorrhizal association may be required for establishment. Canopy opening (from fire, timber harvest, or blowdown) has been shown to adversely affect the species.

Bunchgrass communities - Idaho fescue and bluebunch wheatgrass communities were historically common and have been lost to cropland, grazing, conifer and shrub encroachment, and invasion by annual grasses and noxious weeds. Burning may increase susceptibility to invasion by exotics. Bunchgrasses decline under heavy grazing. Communities in good condition remain in John's Creek ERU often under open conifer overstories, and a few scattered openings in Newsome-Leggett ERU. On National Forest lands, invasion by exotics and conifer encroachment probably represent the greatest threats. Weed management, tree canopy reduction, and careful coordination of fire restoration are needed.

Aspen - Small aspen groves, probably single clones, are found in the Johns Creek, Silver Creek, Red River, and American River ERUs. They usually are limited to sites with subsoil moisture such as seeps or near streams. They are vulnerable to conifer encroachment, and probably have declined in number with fire suppression. Fire will usually favor aspen persistence or recovery, if browsing pressure is not too high.

Cottonwood - Black cottonwood grows as isolated small groups and individuals in areas with high summer moisture and along major streams, particularly along the South Fork in the Camas Prairie ERU. They need fresh substrate for seedling establishment, and typically depend on fire or flooding to provide the point bars or other moist bare soil on which to establish. Fire suppression, and consequent reduction in water yield fluctuations, streamside road construction and floodplain constriction, agricultural use, and dredge removal of valley substrates, have reduced the area available to cottonwood. Restoration or maintenance of this element will require recovery of some of these watershed and channel processes.

Alder Glades - These glades, most common in Newsome-Leggett and Silver Creek ERUs, are a component of the grand fir mosaic ecosystem described by Ferguson (1991), and are dominated by Sitka alder with a forb understory. The glades often contain rare plant species including Oregon bluebells, which is endemic to a few areas in the Pacific northwest. Oregon bluebells is an annual which blooms in the early spring before the alder leaves develop. This species could be sensitive to spring burning.

Caves - Many bat species are closely associated with caves or mines during some period of their life cycle, most typically when a nursing or hibernating. The availability of suitable caves and mines is very limited in the South Fork Subbasin. Management activity has had little impact on this habitat.

Cliffs and Talus Slopes - Rocky outcroppings are used by a variety of wildlife species, including mountain goats, turkey vultures, common ravens, pikas, wolverines, and rubber boas. Both cliffs and talus slopes in the South Fork Subbasin are concentrated in the Gospel-Hump Wilderness. The few such habitats outside of the Wilderness, such as Huddleson Bluffs and Pilot Rock are particularly important for landscape diversity. In other regions of the Inland Northwest, excessive recreational use of these habitats has decreased habitat suitability for several animals, but this is yet of little concern in the South Fork Subbasin.

Montane Meadows - Montane meadows are dominated by mesic grasses, rushes, and sedges. These habitats add diversity to the surrounding expanse of coniferous forest. Common snipe, Lincoln's sparrow, spotted frog, and moose are all associated with montane meadows. Typical examples of this habitat include Buck Meadows, American Meadows, Mill Creek Meadows, Twenty-mile Meadows, and Table Meadows. Both too much disturbance (such as from excessive grazing) or too little disturbance (such as the complete absence of fire for several decades) threaten the viability of these habitats.

Pacific yew communities - Pacific yew is a small tree or tall shrub that grows in relatively moist grand fir and western redcedar habitat types, on sites protected from recent fire. It is relatively common in VRUs 3 and 7 in the subbasin, but rarer in other areas of north central Idaho. With fire suppression, it appears to be increasing. It produces the anticancer agent taxol. Moose locally depend on yew for browse. Maintenance of grand fir old growth in VRUs 7 and 3 will protect core areas of yew.

Water Birch - This is a small to medium tree growing at low elevations, on moist sites, mostly along the South Fork Canyon below about 3500 feet elevation. It depends on fire and flood to provide bare soil for seedling establishment. It has declined in recent years with fire suppression, but persists in root rot created forest openings. Fire created openings, possibly after harvest, may be needed to reverse declines.

Air Quality

General Climatology and Meteorology of the South Fork Clearwater River.

The Aleutian Lows and Pacific Highs are the predominant influences on the local climate within the South Fork Clearwater Basin. The Aleutian Lows develop in the winter bringing periods of heavy precipitation in the form of snow during the winter and rain in the spring. Precipitation under the influence of the Aleutian Lows tend to be long duration low intensity storms.

The Pacific High dominates during the summer months resulting in hot dry weather. High intensity, short duration thunderstorms accompanied by locally strong gusty winds occur infrequently between May and October when the high pressure is weakened and low pressure systems push underneath.

December and January are usually the coldest months with July and August normally the warmest. The highest temperature recorded in the watershed was 116 degrees on July 28, 1934 at Kooskia. The coldest temperature recorded was -48 degrees on December 23, 1983 at Elk City. April, May and June are normally the wettest months with July, August and September being the driest. The average precipitation varies from 30.19 inches at Elk City to 23.3 inches at Kooskia. The highest recorded precipitation was 49.84 inches at Elk City and the lowest 15.09 inches at Grangeville. The most precipitation recorded in a single day was 3.01 inches on September 14, 1955 at Grangeville.

The South Fork Clearwater River flows generally west from the confluence of the Red and American Rivers to the forest boundary. It then flows north from the forest boundary to its mouth at its confluence with the Middle Fork Clearwater River at Kooskia. The shape of the river canyon and it's position in relation to the gradient winds determines how gradient winds exhibit their effect. Gradient winds are generally from the southwest. Normally, most of the canyon is protected from the strong general winds, because it is perpendicular to the wind or too narrow for the wind to penetrate. The uplands on either side of the canyon are exposed to the gradient winds with some of the higher ridges and points being very windy. Where the canyon is narrow with steep sidewalls, it is subject to well-defined and rather strong diurnal winds. Diurnal winds blow up slope and up canyon during the day and down slope and down canyon after sunset. This occurs roughly from the forest boundary to Newsome Creek. These strong diurnal winds are not as well established as you move east in the watershed and the canyon widens.

The South Fork Clearwater and its major tributaries are subject to temperature inversions which tend to pool smoke and other pollutants in the canyon bottoms. These inversions can happen any time of the year, but are more prevalent in the fall and winter. Depending on the strength of the inversion and the speed of the winds, these inversions can persist well into the afternoon.

Location of Sensitive Areas

The South Fork Clearwater River lies totally within North Idaho Airshed 13. Airshed 13 has no non-attainment areas or impact zones. This airshed encompasses the area from the Idaho state boundary on the east and west with Oregon and Montana , the north at the North Fork Clearwater - Lochsa hydrologic divide south to the Salmon River. The downwind airsheds are 3A and 4 in Montana. There is one impact zone, Missoula, in airshed 3A. Past activities such as wildfire have impacted the downwind airsheds.

The Selway - Bitterroot Wilderness Class I airshed is directly downwind of the South Fork Clearwater subbasin. Activities within the subbasin have a direct effect on the air quality and visibility in the Selway Bitterroot Wilderness. There are several population centers within the South Fork Clearwater basin that would be sensitive to air quality. They include Grangeville, Kooskia, Elk City, Harpster, Stites, Mount Idaho, Clearwater, Greencreek, Cottonwood, Orogrande and Big Butte.

Background Air Quality

There is no known historical air quality data for the natural ecosystems in the South Fork Clearwater analysis area. Based on fire history research, we know that fire played a major role in the Northern Rockies. Fire history maps, based on burn mosaics and fire scar interpretation, indicate large fires burned in the subbasin from the early 1870's to 1920 on a frequent basis. Since 1920 there have been no large fires in the subbasin. Studies indicate that the amount of smoke generated by wildfires has significantly declined with the advent of fire suppression in the 1930's. Currently, the amount of smoke generated from wildfire and prescribed fires combined, is much less than the amount produced by wildfires previous to fire suppression.

Air quality associated with the analysis area is considered good to excellent for most of the year. Local adverse affects can occur from prescribed burning and wildfires inside the analysis area as well as these events up wind of the analysis areas. Dust from the 112,000+ acres of agriculture lands in the South Fork Clearwater basin adversely affects air quality. These effects tend to be cyclic and occur in the spring and fall when the ground is dry enough for tillage. Agriculture-associated impacts are the most significant air quality concerns on an annual basis, but effects are seen mostly at the lower end of the drainage.

Another source of pollution is dust from native-surfaced roads, gravel roads and highways. There are approximately 2,100 miles of these roads in the subbasin within the Forest boundary. The Forest Service does not have an inventory of roads on other ownerships in the Camas Prairie ERU. For estimating purposes, a road density of from 2 to 4 miles per section appears reasonable based upon existing (primarily agricultural) uses. This translates to approximately 600 -1,200 additional miles in he Camas Prairie ERU outside the Forest boundary. The roads on private lands and other ownerships are normally open year round and would likely add more dust to the airshed on a yearly basis than restricted roads.

Chapter 4 - MANAGEMENT THEMES

Background

Theme Development and Use

In response to the findings described in Chapter 3, both functional and area themes were developed for the subbasin. The theme intent, terms and definitions are conceptually similar to those described in the ICRB Science Assessment planning effort, where management emphases were assigned to forest and range clusters in the Basin, except that the South Fork themes apply at a finer scale. The themes used for the South Fork landscape assessment are designed to either conserve or restore landscape elements, functions, and/or processes. Generally, a conserve theme is assigned to areas where existing conditions are ecologically sustainable. The objective is to perpetuate existing conditions. A conserve theme does not always imply a hands-off approach to management. A restore theme is applied where conditions are less than desirable and improvement is needed to achieve long term ecological stability and sustainability.

If implemented, the recommended themes would provide pathways or solutions for achieving a range of desirable and sustainable landscape conditions through time. In terms of future planning processes, the South Fork themes will have collateral use in helping to define and develop the purpose and need statement for Forest Plan revision. In addition, the themes will assist in establishing an ecological context for future project planning and analyses, and to prioritize and schedule work including Ecosystem Analysis at the Watershed Scale (EAWS)(USDA Forest Service, 1995).

Notwithstanding the ERU themes, recommendations, and treatment objectives presented in this Chapter, it is important to emphasize that the entire South Fork Subbasin is Nez Perce Tribal ceded lands. As such, under Article 3 in the Nez Perce Treaty of 1855, tribal members are secured the rights of taking fish in all usual and accustomed places, erecting temporary buildings for curing, hunting and gathering and pasturing cattle and horses upon open and unclaimed land.

Functional and Integrated Themes

Functional themes were assigned to four specific resource groups (vegetation, wildlife, aquatics, and recreation) for each of the 12 Ecological Reporting Units (ERUs) within the National Forest in the subbasin (See Table 5.0). In most cases, ERUs were subdivided and themes were assigned based on different ecological conditions within the ERU subdivision. The various themes were also prioritized between ERUs, according to the importance (significance of the action) and urgency (timing). A higher priority was assigned to those areas where the action or theme was considered locally and/or regionally important and urgent. At this stage, no attempt was made to integrate the functional themes. As would be expected, in a few cases, functional theme conflicts surfaced, where execution of actions consistent with the intent one theme would be inconsistent with the objectives of another theme.

Area themes were developed by integrating and prioritizing functional themes. Consideration was given to the magnitude and direction of ecological departures, the ability to affect recovery and restoration, the biophysical capabilities to achieve sustainable conditions, and the need to balance recovery both spatially and functionally across the subbasin. The recommended area theme describes the primary emphasis for an ERU or ERU subdivision in terms of one or more functional themes. An area theme may emphasize one functional theme, but the other themes are still important. For example, restoring aquatic processes through road reduction, road drainage treatments and other upland sediment source reduction needs to occur concurrently with restoring open stands of large ponderosa pine in the South Fork Canyon.

Road themes are a product of integrating functional themes. Road themes address future road maintenance and development in terms of socioeconomic needs and conserving/restoring biophysical processes, functions, and elements.

Conflicting Theme Objectives

The assigned functional themes for an ERU may not be compatible in all situations. Having several functional themes with differing objectives adds complexity to developing specific solutions for an area or project. When there is a conflict between the different functional themes (e.g. vegetation and aquatics), the manager is encouraged to fall back to area theme with the aid of site specific information for overall guidance in the ERU. Other considerations are subbasin-wide conditions. In general, aquatic conditions have been more altered in the subbasin than terrestrial. Aquatic cumulative effects have reduced the capacity of the mainstem South Fork and it's tributaries to sustain healthy populations of native fish. **Given this, an overarching theme for the subbasin is aquatic restoration even though some ERU area themes have a terrestrial emphasis.**

Functional Theme Descriptions

Aquatic Themes

The aquatic management themes are organized into two general groups, 1) Conserve Existing Aquatic Function, and 2) Restore Aquatic Processes. The Conserve theme is recommended for areas that are believed to have aquatic processes and conditions within the range and frequency of natural processes and conditions. These are areas considered to be in 'good condition'. The Restore theme is recommended for areas where the processes and conditions are not within the natural range and/or frequency of natural processes and conditions. These are areas where the aquatic processes and conditions are considered to be 'degraded' by human activity or extreme natural events. The priorities established within each of these general groups is based on the importance of the area for conservation and recovery of aquatic species at risk and key human uses.

Conserve Existing Aquatic Function (Ceaf) - This theme is recommended for areas where the aquatic processes and conditions are believed to be within the natural range and frequency of occurrence. These are areas that are considered good condition habitat. There may be areas within these ERU's that don't meet this criterion, these are discussed in the specific ERU descriptions in Chapter 4. The aquatic management theme recommended for these areas is to maintain the current functional aquatic processes, and the resultant conditions. In general, active measures would not be required to conserve these processes, but would require management of risks associated with other management objectives. Regardless of the priority, all basic standards, guidelines, and legal requirements apply to all areas.

Conserve Existing Aquatic Function: Very High Priority - This theme is recommended for areas that are critically important to the conservation of aquatic species at risk, and/or water from these areas is used for key human uses, such as municipal supply watersheds. This theme is recommended for strongholds and habitat strongholds. These areas are the foundation of existing species viability and future source areas for the rebuilding of restored habitats. Management activities that have the potential to degrade the aquatic function or condition of these areas should not be undertaken.

Conserve Existing Aquatic Function: High Priority - This theme is recommended for areas that are very important to the conservation of aquatic species at risk and/or water from these areas is used for important human beneficial uses. These areas are generally occupied by at-risk species, with moderate to high habitat potential. The aquatic species at risk are generally present in these watersheds, although frequently at low numbers. If these areas are not currently occupied, they are considered good opportunities for re-establishment. Only management activities that pose little risk to degrade the aquatic function or condition of these areas should be undertaken.

Conserve Existing Aquatic Function: Moderate Priority - This theme is recommended for areas that are important to the conservation of aquatic species at risk and existing water quality, but less so than those areas with a high or very high priority. These are areas that are either not occupied by aquatic species at risk, or these species are present in very low numbers. Additionally, these are areas with low-moderate potential to support the species. These areas do not contain suitable spawning habitat or quality rearing habitat (or the area is inaccessible due to natural barriers) and use by these species may be limited to summer low flow rearing. In this case, these areas do not provide unique or high quality rearing habitat. Generally these areas are critical contributing areas to downstream occupied habitat. Management activities in these areas should not have the potential to degrade hydrologic/aquatic function, or translate effects downstream that may adversely effect occupied habitat. These are areas where the aquatic management objectives need to be balanced with the other management objectives for the area.

Conserve Existing Aquatic Function: Low Priority - This theme is recommended for areas that are not considered important for conservation of aquatic species at risk. These areas are not occupied by aquatic species at risk, and they are not critical contributing areas to habitats occupied by aquatic species at risk, with the exception of large mainstem rivers with rearing and migration habitat only. When these areas are contributing areas to downstream occupied habitat, including mainstem rearing and migration habitat, this theme is recommended for areas that are not sensitive to disturbance with resultant downstream effects or have little to no capability to effect these downstream areas. These are areas where other management objectives and actions should take priority.

Restore Aquatic Processes (Rap) - This theme is recommended for areas where the processes and conditions are not within the natural aquatic range or frequencies. These are areas where the natural regimes (e.g. sediment, water yield, temperature, or riparian areas) have been altered. These areas are considered 'degraded' by either human activity or extreme natural events. There may be portions of the ERU where processes and conditions do not meet this criteria. The aquatic management theme recommended for these areas is to restore the aquatic processes and resultant conditions. The priority for this restoration is based on the value of these areas to aquatic species at risk or key human uses, such as municipal supply watersheds. Additionally, the aquatic processes have been subdivided into three categories to describe, in general terms, those processes should be the focus of the restoration efforts. These categories are: watershed, riparian, and instream processes. This discussion of restoration focus is included in the specific ERU descriptions.

Restore Aquatic Processes: Very High Priority - This theme is recommended for areas that are critically important to both the stabilization of existing populations of aquatic species at risk and the recovery of these species. Municipal watersheds, where water quality conditions are significantly affecting use, are also placed in this category. These are areas considered to be critical to species metapopulation function, and the resilience of the metapopulation to disturbance, both natural and human. A lack of restoration in these areas is likely to result in further loss of viability for the species considered. These are areas with a high to very high potential to support the species.

These areas are currently occupied by strong populations, or the existing populations are considered the best opportunities for rebuilding populations to stable levels. These areas are also critical for recovery of the species. They are considered the best opportunities for future source areas for refounding populations. The balance of management actions in the subbasin needs to include this restoration as a top priority if aquatic species at risk are to be conserved. Restoration in these areas should not be evenly balanced with other actions that have the potential to degrade or retard the recovery of these areas. Integrated management actions in these areas need to be heavily weighted toward aquatic restoration. The objective for these watersheds should be restoration at the fastest possible rate.

Restore Aquatic Processes: High Priority - This theme is recommended for areas that are very important to both species conservation and recovery. Areas where other human beneficial uses of water are being seriously affected may be placed in this category. These are areas of moderate to high species potential, that have the capability to support strong populations. These areas are critical to long term metapopulation function. These areas are generally occupied by the species being considered, although usually at low levels. These are important areas for aquatic restoration to proceed. Restoration of these areas will be important for stabilization of the species and the basis for recovery. The restoration of these areas may require significant effort and time, and needs to be a long term, focused effort. Restoration efforts in these areas should not be affected by other management actions that have the potential to degrade or retard recovery of aquatic processes. Other management actions should be designed to minimize the risk to the aquatic ecosystem, and the balance of these actions should be heavily weighted toward aquatic recovery. The rate of restoration in these areas should be accelerated through active restoration if possible, although it will not be practical to focus on all of these areas at once.

Restore Aquatic Processes: Moderate Priority - This theme is recommended for areas that are important for aquatic species recovery, but not critical. These are areas that have a moderate to low habitat potential for the species or are critical contributing areas to mainstem habitat. These areas are considered adjunct habitats in most cases where suitable habitat exists. These areas are either not currently occupied, or the population levels are very low. Where these areas are critical contributing areas, their restoration is important, although other higher priority areas may exist. Aquatic restoration in these areas should be balanced with other management objectives. These other management actions should not retard the natural recovery of these areas, and they should be integrated with restoration actions that provide for or accelerate restoration.

Restore Aquatic Processes: Low Priority - This theme refers to areas that are not considered important for conservation and recovery of aquatic species at risk. No "low priority" areas have been identified for the subbasin. These areas are not occupied by these aquatic species, and they are not critical contributing areas to habitats occupied by aquatic species at risk, with the exception of large mainstem rivers with rearing and migration habitat only. The restoration of these areas is not considered important to recovery of these species. These areas do not contain suitable habitat or contain limited habitat with low capability. These are areas where other management objectives and actions should take priority. However, restoration activities should be pursued as opportunities arise in these areas.

Vegetation and Wildlife Themes

The vegetation and wildlife management themes are organized into three general groups: 1) Restore, 2) Conserve, and 3) Produce. The Restore theme is recommended for areas where natural processes or patterns are outside the range of historic, and where continued traditional management approaches threaten loss of habitats, communities or populations. The Produce theme also applies to areas where recent management has resulted in short supply of some important habitat elements, such as snags and early seral structural stages. The Conserve theme is recommended for areas that are believed to have terrestrial processes and conditions within the range and frequency of natural processes and conditions. These are areas considered to be in "good condition". Conserve may require introduction of some disturbance (fire or timber harvest) to maintain conditions within the natural range. The priorities established within each of these general groups is based on the degree of departure from historic ranges and the consequent risk of loss.

Restore Ponderosa Pine - Restore high and moderate frequency, low and mixed severity terrestrial disturbance regime, to recover open and two story stands dominated by medium and large ponderosa pine, with some Douglas-fir and western larch. This theme is suited to VRUs 3 and 4. Disturbance activities in subwatersheds can occur as often as every 5 to 30 years. The frequency of disturbance and diversity of disturbance size are highly compatible with the Roads theme 4: Develop and maintain the existing road system and Roads theme 2: Maintain the core road system and reduce road-related adverse effects throughout. Prescribed fire is also highly suited to this theme.

On south aspects, ridges, and other dry sites, harvest or fire treatments favor recovery and maintenance of open stands of medium to large ponderosa pine, with less Douglas-fir, and minor western larch and grand fir. Patches vary in size from a few acres to several hundred acres. Treat weeds and use harvest, fire, grazing, and seeding to recover native bunchgrasses. On north aspects, dominantly midslope positions, harvest or fire treatments favor about 50 percent stand replacement with 2-10 trees per acre of medium or large pine, western larch, Douglas-fir and some grand fir; and 50 percent development of two story stands with 10-50 ponderosa pine, Douglas-fir, western larch, and grand fir per acre in the overstory. Patches vary in size from a few acres to several hundred acres. Relative proportion by size class averaged across both aspects is about 5-20 percent nonforest, 5-30 percent seedling/sapling, 10-20 percent pole, 20-40 percent medium tree, and 20-40 percent large tree. Old growth is about 15-30 percent on north aspects and 40-60 percent on south aspects, and 20 to 30 percent overall.

Background - Fires historically were more frequent and less severe than recent harvest, maintaining open stands of medium and large ponderosa pine on south aspects; and moderately open to closed, one story, and two story stands of mixed conifers with ponderosa pine, Douglas-fir, and western larch overstory on north aspects. Early harvest removed large ponderosa pine and other seral fire tolerant overstory. Harvest has shifted disturbance to infrequent mixed and severe treatments, with continued loss of seral fire tolerant species in the overstory, while fire suppression and forest succession have resulted in increased density of Douglas-fir and grand fir more vulnerable to fire, insect and disease activity.

Priority - Restoring ponderosa pine is considered a high priority when compared to other vegetation treatments in the subbasin. Approximately 105,000 acres of VRU 3 and 4 occur on Forest lands in the subbasin for which this theme is appropriate (See Map 50).

Restore Whitebark Pine - This theme is suited to VRUs 1, 2 and 9. Restore moderate to low frequency, mixed and lethal severity terrestrial disturbance regime, to recover seral species in cold harsh climates: whitebark pine and lodgepole pine, with lesser amounts of Engelmann spruce, Douglas-fir, and subalpine fir. Treat high elevation ridges (greater than 7000 feet) as often as every 20-50 years with low and mixed severity fire. Emphasize inventory and cone collection to develop rust resistance, and maintain seral whitebark in the stand through reduction of competition from subalpine fir, spruce and lodgepole pine. Disturbance activities can occur no more often than once every 30-50 years in subwatersheds at lower elevation areas (5500 - 7000 feet). The infrequency of disturbance, the size of disturbance, the erodible soils and harsh climates on which whitebark pine occur, and the proportion of this theme that is in wilderness, suggest that roads are often not applicable where this theme is appropriate. In VRU 1, the restore whitebark pine theme is united with the restoring vegetation pattern theme.

Favor treatments that increase size and heterogeneity of patch size (100s to 1000s of acres), provide extensive medium tree and pole snag patches, and provide open areas for caching of whitebark pine seed. Locate and maintain existing whitebark pine so that selection for rust resistance can operate. Patch size is 10s (VRU 9) to 1000s (VRU 1) of acres. Relative proportion by size class is 30-40 percent nonforest, 10-30 percent seedling/sapling, 15-60 percent pole, 1-10 percent medium tree, and 1 percent or less medium tree on VRU 9; about 5-10 percent nonforest, 20-30 percent seedling/sapling, 20-30 percent pole, 20-30 percent medium tree, and 5-15 percent large tree in VRU 1; and 10-25 percent nonforest, 10-30 percent seedling/sapling, 30-65 percent pole, and 5-15 percent medium tree in VRU 2. About 5-15 percent of the area is old growth.

Background - Fires historically were more frequent in VRU 9 and moderate to large and infrequent in VRUs 1 and 2. High elevation ridges supported mixed stands of whitebark, lodgepole, spruce, and fir. Blister rust, fire suppression, forest succession and perhaps mountain pine beetle have contributed to the severe decline of whitebark pine, and forest succession and fire suppression have also led to decreases in lodgepole pine. Recent uniformly dispersed clearcut harvest in VRU 1 has tended to make each watershed more similar to one another in successional state, range of patch sizes, and stand character, and deficient in providing extensive patches of pole and medium tree snags.

Priority - Restoring whitebark pine is considered a very high priority when compared to other vegetation treatments in the Subbasin. Approximately 98,000 acres of VRU 1 occur on Forest lands in the subbasin for which this theme is appropriate, using fire and harvest, and about 37,000 acres of VRUs 2 and 9 occur, for which fire is likely the most feasible treatment option, because these lands are dominantly wilderness.

Restore Vegetation Pattern - This theme is suited to VRU 6 (and 1). Restore low frequency, mixed and lethal severity terrestrial disturbance regime, at moderate to large scales to recover landscape pattern and seral species in cool and cold climates: lodgepole pine, Douglas-fir, and western larch, with Engelmann spruce, subalpine fir, and occasional whitebark pine. Disturbance activities in subwatersheds should occur no more often than every 30-50 years. In VRU 1 this is united with the restore whitebark pine theme. The infrequency of disturbance, disturbance size, and aquatic resource values are highly compatible with a reduce Roads theme #3, which emphasizes reducing overall road densities.

Favor treatments that restore size and heterogeneity of patch size (100-1000s of acres), provide extensive medium tree and pole snag patches, and provide open burned areas for caching of whitebark pine seed, and establishment of lodgepole pine and western larch. Patch size is 10s to 100s (VRU 6) to 1000s of acres (VRU 1). Relative proportion by size class is about 5-10 percent nonforest, 20-30 percent seedling/sapling, 20-30 percent pole, 20-30 percent medium tree, and 5-15 percent large tree in VRU 1, and 5-10 percent nonforest, 10-30 percent seedling/sapling, 30-45 percent pole, 20-40 percent medium tree, and 5-20 percent large tree in VRU 6. One to 10 overstory western larch, Douglas-fir, lodgepole, grand fir, or Engelmann spruce per acre are common.

Background - Fires historically were moderate to large and infrequent in VRU 1 and 6. Extensive areas of even aged patches of lodgepole, with some western larch and Douglas-fir, were dominant. Lesser grand fir, Engelmann spruce, and subalpine fir occurred, often along streams. Forest succession and fire suppression have led to decreases in lodgepole pine and western larch, and increases in spruce-fir forest. Recent uniformly dispersed clearcut harvest in VRU 1 and 6 has tended to make each watershed more similar to one another in successional state, range of patch sizes, and stand character, and deficient in patches of pole and medium tree snags.

Priority - Restoring vegetation pattern is considered a moderate priority when compared to other vegetation treatments in the subbasin. Approximately 224,000 acres of VRUs 1 and 6 occur on Forest lands in the subbasin for which this theme is appropriate, using fire and harvest (See Map 50).

Conserve Existing Vegetation Conditions - This theme is suited to VRUs 5, 7 and 10. Maintain low frequency, mixed severity terrestrial disturbance regime, at small to moderate scales to sustain landscape pattern and seral species in cool moist climates: lodgepole pine, Douglas-fir, and western larch on ridges, with grand fir, Engelmann spruce, subalpine fir, and Pacific yew on lower slopes or moist areas. Disturbance activities in subwatersheds can occur no more often than once every 20-40 years. This frequency and scale of disturbance are compatible with a reduce road density or reduce road related effects theme.

Favor treatments that maintain seral species on uplands and complex age class structure. Patch size is 5 acres to 100 acres. Maintain15-40 percent of stands with 10 or more trees per acre older than 150 years. Sixty percent of stands have two or more age classes. Relative proportion by size class is about 1-10 percent nonforest, 5-20 percent seedling/sapling, 10-25 percent pole, 25-35 percent medium tree, and 35-45 percent large tree in VRU 7 and 10-25 percent nonforest, 15-25 percent seedling/sapling, 20-30 percent pole, 25-40 percent medium tree, and 15-25 percent large tree in VRU 10.

Background - Fires historically were usually small to moderate in size, mixed severity, and infrequent in VRU 7 and 10. Two or more age classes were common. Pacific yew and mesic old growth were important. Forest succession and fire suppression have resulted in some declines in early seral stages, and loss of snags. Harvest has favored stand replacement but has not been very extensive.

Priority - Conserving existing vegetation conditions is considered a moderate priority when compared to other vegetation treatments in the subbasin. Approximately 106,000 acres of VRUs 5, 7 and 10 occur on Forest lands in the subbasin for which this theme is appropriate, using fire and harvest (See Map 50).

Conserve Late Seral Forest - Late seral forest (mature, overmature, and old growth) provides vital habitat for several wildlife species. For the purposes of this discussion, mature forest can be thought of as greater than 80 years old, overmature forest as greater than 120 years old, and old growth forest as greater than 150 years old. In general, mature forest is well distributed throughout the subbasin, but current old growth forest is limited, encompassing only 10-20 percent of total possible forested acres (this figure is a rough estimate derived from Map 44). This theme emphasizes retention of late seral forest by discouraging regeneration timber harvest (i.e. silvicultural prescriptions such as clearcut, seed tree, and shelterwood). In some cases, intermediate timber harvest (such as commercial thinning, individual tree selection, and group selection) may be compatible with this theme, depending on site specific conditions and objectives. Extra care must be taken to ensure retention of sufficient snag and down woody debris densities (these vary by forest type; see Wildlife Technical Report for details). Underburning is compatible with this theme where the objective is to retain and maintain late seral ponderosa pine or western larch forest. The introduction of stand replacing (high severity) prescribed fire in late seral forest however, is not compatible. In all cases, this theme favors the retention of old growth forest, over overmature forest, and overmature forest. Priorities and specifics regarding the amount and distribution of late seral forest that should be retained varies by wildlife species, and are detailed in the ERU themes, as well as in the Wildlife Technical Report.

Produce Early Seral Habitat - Early seral forest (deciduous brush and seedling and sapling trees) provides vital habitat for several wildlife species. Such forest is defined as less than 30 years after disturbance, and so includes post fire habitats characterized by recently burned forest with extensive snags. Historically, approximately 9 percent (in 1959) to perhaps 25 percent (in 1911) of the subbasin would have been in early seral habitat, as compared to 6 percent today. Almost all (more than 90 percent) of the existing early seral habitat has originated from timber harvest, as opposed to the historic condition where fire produced virtually all of such habitat. Producing early seral habitat would require timber harvest and/or burning of existing forest. In areas where a Conserve Late Seral Forest is a companion theme, production of early seral habitat would be most compatible by concentrating on mid seral forest (pole and immature timber). In areas where Conserve Late Seral Forest is not a companion theme, production of early seral habitat could be accomplished by harvest or burning of late seral forest. Priorities and specifics regarding the amount and distribution of early seral forest varies by wildlife species, and are detailed in the ERU themes, and in the Wildlife Technical Report.

Enhance Wildlife Security - Elk, wolverine, gray wolf, fisher, and marten are all sensitive to the availability of wildlife security, albeit to varying degrees. A Wildlife security area is defined as areas greater than 250 acres in size that are greater than 0.5 mile from the closest road or trail allowing motorized use. Enhancing wildlife security would require additional road and trail restrictions on the season and types of use allowed. This theme will require close coordination with recreational concerns, especially in areas where a companion theme of Provide Trail Recreation (Ptr) and Provide Roaded Recreation (prr) has been assigned (see Table 5.0). Specifics are detailed in the ERU theme descriptions and in the Wildlife Technical Report.

Roads Themes

Roads are an element in the landscape that pose unique complexities. The effects of roads can be linked to a great many resource areas. The extent and intensity of these effects vary with site specific factors and with scale of evaluation. The subbasin scale is useful in providing the overall context for road management.

Road densities have been used as effects indicies in order to evaluate the effects of roads and as proxies to evaluate the effects not directly attributed to the roads themselves. The pathways of these effects vary by resource area and in many resource areas, levels of effect are estimated by broad correlations. An evaluation of actual effects is needed. Roads also have effects that are beneficial, providing access for a variety of uses including recreation, vegetation management, fire suppression and commerce. Obviously, road system management must reflect an interdisciplinary analysis of resource benefits and consequences. Road management objectives are used to define objectives for a given road, its uses, maintenance schedule and operating life.

Effects upon Aquatic Resources - Effects of roads on aquatic resources can occur through on-site sedimentation delivered to streams, movement or migration blockages at stream crossings, floodplain and riparian alteration from streamside roads, and slope hydrology effects through subsurface flow interception. The degree to which these impacts occur depends greatly upon site specific factors such as proximity to streams, soils factors, road uses, and road grades. Proper and timely road maintenance is very important in preserving drainage function and minimizing sedimentation and road failure risks.

Effects upon Terrestrial Resources - Effects of roads on terrestrial resources can take many forms. Roads increase human activity and therefore can affect disturbance-sensitive species. Roads act as a conduit for noxious weed spread. Roads form barriers to migration and propogation of some plants and animalsn as well as causing direct compaction and disturbance of the roadway itself.

Effects upon Social Resources - Roads can facilitate certain types of wildland and developed recreation, provide access for vegetation management and the administration of the land, and provide access to mineral claims, grazing allotments, and private ownerships. Roads can also induce adverse effects upon such things as scenic resources and unroaded recreation opportunities. Roads also increase the potential for vandalism and poaching.

As is readily discerned from the above effects summaries, roads are linked to a great many resource areas and effects pathways. Recommendations from the ICRB Science Assessment suggest reducing the adverse effects of roads. Throughout the subbasin this is an overarching objective that cannot be overemphasized. The means to achieve reductions in adverse road effects lies in quality road management that evaluates effects within the ecological context, and prescribes management and treatments to address those effects.

Road themes have been developed to provide road management focus to the ERUs within the subbasin (See Map 52). This provides the ecological context at the subbasin scale. The road themes facilitate integration of the resource themes and are themselves an integration product. They do not resolve all road concerns and conflicts between resource themes and uses. However, if implemented as recommended at the ERU scale, the road themes should reduce the risks to ecological processes while preserving most of the beneficial uses associated with roads. The continual review, evaluation, and documentation of road management objectives at watershed and project level scales is critical. It is important to remember that notwithstanding the ERU road themes, the full range of road treatments available to address adverse road effects applies to all ERUs.

This assessment provided an opportunity to review the transportation system at a broader scale than individual project analyses. Opportunities exist to repattern the road system to improve the efficiency of the road network, while reducing resource effects.

An important concept associated with road system repatterning is the ephemeral road system. In an ephemeral road system, the transportation system consists of a permanent road system that persists through time, that is fed by a network of temporary roads that exist for defined purposes, typically vegetative management. By managing access under this ephemeral concept, some of the long-lived press disturbances (i.e. sedimentation) associated with roads can be avoided.

The ephemeral road system concept is applicable across the subbasin for vegetative treatment needs. However, its greatest utility is when applied to VRUs 1 and 6, and to a lesser extent 4, 5, 7, and 10. Typically, ERUs with the "reduce road density" theme #3 will employ the ephemeral concept. Roads to be treated to achieve reductions in road density are primarily native surface roads. Transportation planning maps that present possibilities for road reduction and road management under the ephemeral concept are included in the project file. The roads theme definitions applicable in this subbasin are shown below (see Table 5.0).

Defer New Roads - In general, additional road development is not anticipated in a 10-15 year time frame. This theme applies to ERUs where aquatic potential and integrity are high and where there are few existing roads. Opportunities to reduce road related effects will rely heavily on quality road maintenance that will likely require site specific treatments.

Maintain a Core Road System and Reduce Adverse Effects Throughout - The existing road system (miles and distribution) is at a level where it generally provides sufficient access for the next 10 -15 years (in some subwatersheds the existing road system may be more than is needed). Many of the existing routes will be retained, although this theme does not preclude removal of local roads that through watershed analysis and transportation planning can be identified as excess to the transportation system. Conversely, this theme recognizes that construction of local roads, primarily temporary, may also be required. Reconstruction of some road segments may be appropriate to reduce the risks of sedimentation and to address stability hazards. Efforts to adequately document appropriate road management objectives and to develop road maintenance schedules are very important in these ERUs.

Reduce Adverse Effects with an Emphasis on Reducing Overall Densities - In general, in ERUs with this theme, fewer roads are needed for the next 10 -15 year timeframe. Road densities can be reduced to reduce risks to both the terrestrial and aquatic resources. Transportation plans should reflect the ephemeral road concept. While some road segments may need to be reconstructed or relocated, the overall goal is a net reduction in road densities (primarily native surfaced roads) over time (up to 50 years per the ICRB Science Assessment). Watershed analysis and transportation planning should be conducted to identify where roads are no longer needed. Reducing surface erosion on permanent roads through appropriate maintenance or stabilization treatments is also a high priority.

Develop and Maintain the Road System. Focus on Maintaining the Existing Road System - This theme applies where additional road development may be needed in the 10 -15 year timeframe to treat vegetation. These roads may be either temporary or permanent and should consider the ephemeral transportation concept. This theme applies only to the Lower Silver Creek and Lower (east and west) Wing - Twentymile Creek ERUs. These areas differ from others in the subbasin principally in the nature of the existing road system. The existing road development in these areas has occured more recently than other areas and the roads that are in place exhibit a relatively high level of resource mitigation.

Wilderness...Roads not Applicable - This theme was applied to ERUs where most of the area is within designated Wilderness.

Recreation Themes

The recreation themes are premised on the fact that a wide variety of recreational opportunities exist in the subbasin, and in order to maintain and enhance such opportunities, different management emphasis may be needed in different areas. In some cases, some recreational pursuits may not be consistent with others. The application of the recommended recreation themes is intended to reduce conflicts where possible, take full advantage of the past and existing uses and characteristics of an area, and to assure that the full range of recreational opportunities is available in the future. Where the characteristics are unique, the themes will help to assure that they persist. Where certain recreation opportunities are in short supply, or are being over used, the themes will address increasing facilities where possible.

Conserve Scenic Integrity - The theme assumes determination of scenic classes and a description of the desired naturally evolving landscape characteristics (landscape character). Desired landscape character must consider ecosystem dynamics and trends. The overall landscape character is maintained through time by proper management of scenic attributes. The landscape character goal may indicate the need to create different scenic viewing opportunities within the same landscape unit as vegetation grows and current vistas disappear. When there are considerable differences between existing and desired landscape character, it may be necessary to design a transition strategy. The design should include a reasonable time frame for reaching the goal and exclude excessive increments of change.

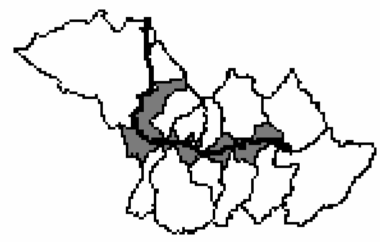
Provide Developed Recreation - The theme emphasizes providing campgrounds and other permanent developments such as toilets, picnic shelters, trailheads, interpretive displays, dump stations, boat ramps, wells and water distribution systems. Facilities are developed and maintained with high regard for user safety, in response to high use levels and consistent with the national forest settings and uses. Developed recreation facilities are often designed to recognize local historical or significant ecological conditions or events. Developed sites also require assessing and achieving desired landscape character goals and scenic integrity objectives.

Provide Trail Recreation - The theme emphasizes providing access to the area on trails by means other than highway vehicles. It requires assessing trail uses, public preferences, conflicts with other resources, and planning development and maintenance strategies. It means maintenance and reconstruction of trails to accommodate desired uses and protect trail and other resources. The theme calls for providing convenient and accurate access information and route signing. It means recognition, protection, and enhancement of trail values when implementing other activities or regulatory strategies. Areas with this theme should also emphasize the achievement of desired landscape character goals and scenic integrity objectives.

Provide Roaded Recreation - The theme emphasizes accommodating access to the Forest to recreationists travelling by highway vehicle. The theme calls for assessing access needs, public preferences, and conflicts with other uses. It includes providing convenient and accurate access information, route signing, safe and maintained roads, parking and trailhead access, and above all, adequate sites to pull off the road for day use or overnight camping. It also stresses recognition of and interpretation of significant historical and ecological conditions or events. Areas with this theme should also emphasize the achievement of desired landscape character goals and scenic integrity objectives.

Theme Descriptions by Ecological Reporting Unit

South Fork Canyon Ecological Reporting Unit



Area Themes - Lower South Fork Canyon: Restore ponderosa pine and conserve scenic integrity. Upper South Fork Canyon: Restore vegetation pattern and conserve scenic integrity.

Location and Size - The South Fork Canyon includes mostly steep lands adjacent to the South Fork Clearwater River from the western Forest boundary near Harpster upstream to the confluence of American and Red Rivers. The ERU encompasses approximately 90,000 acres. See Map 7.

Aquatic

Theme **-** Restore Aquatic Processes (Moderate Priority)

Background **-** The South Fork Canyon ERU (90,058 acres) contains the mainstem South Fork River, and the face drainages that are tributary to the mainstem. In general, these tributary watersheds do not support spawning populations of spring chinook, steelhead, and bull trout. Westslope cutthroat are found in some of these tributary steams. This area is composed primarily of ALTA 3, low elevation breaklands, with the upper subdivision having a significant component of ALTA 6 (Map 6). The South Fork Canyon ERU is contained in hydrologic zone 3.

The South Fork mainstem provides subadult/adult rearing habitat for bull trout and westslope, juvenile rearing and migratory habitat for spring chinook, and juvenile rearing, migratory, and spawning habitat for steelhead.

Historic mining has affected portions of the mainstem and some tributaries, mostly in the upper subdivision (Map 15). There has been a moderate to high level of timber harvest in this area, about 3,300 acres of this harvest has been in the RHCA (see Map 12). There are approximately 487 miles of existing road in this area, about 160 miles of this road are located in the RHCA area (Maps 13, 14). There are many roads, including most of the main highway along the river, that have encroached on stream/riparian processes (Map 15). About 1/3 of this area is contained in areas of low development (Map 21).

Findings **-** There has been a moderate level of management activity in the South Fork Canyon ERU. The effects of these activities have been primarily in stream/riparian process and sediment yield. The stream/riparian processes have been influenced by historic mining and road encroachment. The sediment regime has been influenced by activities throughout the area. Road construction and historic mining in this ERU have contributed to conditions in the South Fork mainstem river, due to the close proximity of the ERU to the river and the general steepness of the slopes. Most of this area is subject to frequent natural disturbances. Exactly how the management activities in this ERU have affected the sediment regime in the mainstem river is not known.

The South Fork provides valuable rearing and migratory habitat for the four fish species assessed, along with some spawning habitat for steelhead. This aquatic habitat has been negatively affected by the management activities in the entire subbasin.

Recommendations/Treatment Objectives **-** The recommended aquatic theme for the South Fork Canyon is restore aquatic processes, moderate priority (Map 48). This theme applies to the areas within this ERU, not to the mainstem river itself. The restoration priority for restoring the condition in the South Fork river is high. This rearing habitat is limited in the subbasin. Large migratory bull trout and cutthroat in the subbasin, necessary for population stability, need restoration of this habitat to be successful. Restoration of this habitat would also directly affect spring chinook and steelhead survival. The restoration of this habitat should focus on the stream/riparian processes and the sediment regime. While the sediment regime is affected by activities throughout the subbasin, the stream/riparian processes are affected most directly by activities immediately adjacent to the mainstem river.

The areas within the South Fork Canyon ERU efficiently contribute to the condition in the mainstem river, along with the other watersheds in the subbasin. Restoration of the mainstem habitat condition is dependent on restoration in this ERU. The priority for this restoration is somewhat lower, given that these areas, in most cases, do not support fish in the tributary streams. The primary focus of this restoration needs to be the sediment regime, principally the upland sediment sources and activities that increase the risk of mass movement or debris torrents. The existing roads in this area need to be a central focus in achieving this restoration objective.

The area theme for the South Fork Canyon is the restoration of ponderosa pine in the lower subdivision and restoration of vegetative pattern in the upper area. If these objectives are pursued, it will be important to also focus on aquatic restoration in this area. This would need to be achieved both through minimizing the risk associated with new activities, along with improvement projects that address existing problems. These improvement projects should be integrated into the other management actions to the extent possible.

Vegetation

Themes - Lower: Restore ponderosa pine (High Priority). Upper: Restore vegetation pattern (Moderate Priority).

Lower Canyon Background and Findings - In VRUs 3 and 4, plant communities were historically shaped by low and mixed severity fire, and featured ponderosa pine and Douglas-fir, with some grand fir, western larch, and Pacific yew, and a minor amount of spruce. Bunchgrass was important on the warmest sites. Fire suppression, forest succession, and timber harvest have resulted in declines in open pine stands, and increases in grand fir and Douglas-fir. Significant areas of fire risk outside the historic range (Map 46) occur in this area, made more complex by intermingled land ownership and the nearby Forest boundary.

Lower Canyon Treatment Objectives - Disturbance activity in subwatersheds as often as every 10 to 30 years may be appropriate in the lower canyon. The northern most South Fork Canyon includes small areas of cedar habitat types and historic occurrence of western white pine where white pine restoration is appropriate. About 62,000 acres of VRUs 3 and 4 are potentially suitable for the ponderosa pine restoration theme in this ERU.

Upper Canyon Background and Findings - Located mostly east of Golden, VRU 6 has gentler slopes and was subject to more infrequent stand replacing and mixed fire than the lower canyon. Lodgepole pine and western larch were more important than ponderosa pine. In these areas, harvest disturbances have been traditionally dispersed, mostly clearcut, and more frequent than historical fire disturbance. Diversity of patch size, and abundance of snag patches have been lost.

Upper Canyon Treatment Objectives - Disturbance activities in subwatersheds no more than once in about 35 years is a core part of this theme to help recover watershed function and treatments scaled more in harmony with historic process. Working to reconfigure disturbance patterns (often within existing sale areas), produce more early seral stages, provide snag patches, and greater variety of patch size while retaining some overstory western larch, Douglas-fir, and grand fir comprise the theme in these upland areas. Some dry, low elevation communities, like bunchgrass, bank monkeyflower, and mountain mahogany are rare elements in this ERU, and are a high priority for protection or restoration. About 16,000 acres of VRUs 1 and 6 are potentially suitable for restoration of vegetation pattern.

Wildlife

Themes - Restore ponderosa pine (Very High Priority), Produce early seral habitat (Very High Priority), and Conserve late seral habitat (Low Priority).

Background and Findings - The South Fork Canyon contains the greatest amount of fire-climax ponderosa pine forest of any ERU, although much of it is in degraded condition due to the effects of fire exclusion. High quality fire-climax forest provides critical nesting habitat for flammulated owls. Consequently, the South Fork Canyon ERU has the greatest potential of any ERU for flammulated owl management. The South Fork Canyon also provides winter habitat for most of the subbasin's elk, making the availability of grass and brush forage very important. Because grass and brush forage are available in fire-climax ponderosa pine forest, both Restore ponderosa pine and Produce early seral habitat themes would benefit elk. The eastern end of South Fork Canyon is dominated by lodgepole pine forest, which could be managed to benefit black-backed woodpeckers. The need to conserve late seral habitat is due to the area's high potential as pileated woodpecker habitat.

Treatment Objectives - Restore ponderosa pine (VRUs 3 and 4): This theme recommends restoration of the open-grown forest structure that once typified fire-climax ponderosa pine. The goal should be to create stands with an overstory of old growth (greater than 150 year old) ponderosa pine/Douglas-fir with multiple canopy layers, low tree density, moderate to low canopy closure, and moderate ground cover. The highest priority for such management are those stands that would result in the most immediate benefit to flammulated owls, and are characterized as being older than 60 years, with ponderosa pine forest types (or Douglas-fir forest types with a strong component of overstory ponderosa pine), on ridgetops to midslopes, with slopes less than 45%, and are between 3600 and 6200 feet in elevation. Flammulated owl presence/absence surveys should be conducted before any timber harvest or prescribed burning is implemented in such stands, to help ensure that existing flammulated owl "clusters" would not be impacted.

Produce early seral habitat: The purpose of this theme is to benefit elk (High Priority; VRUs 3, 4, 12) and black-backed woodpecker (Moderate Priority; VRUs 1, 3, 4, 6 ,7, 8, 10). Creating habitat for wintering elk could be accomplished by either fire or timber harvest. To allow maximum elk use of forage, no clearcuts should be greater than 1000 feet wide. The goal should be to maintain 40% of VRUs 3, 4, 12, and 16 in early seral or fire-climax ponderosa pine habitat. Currently, only 15% of the South Fork Canyon is in early seral habitat, while 7% provides fire-climax habitat suitable to wintering elk. To improve habitat conditions for black-backed woodpecker, lethal severity prescribed burns should be applied in lodgepole pine forest in the eastern-most portion of the South Fork Canyon (especially in VRU 6). Applications might include partial harvest of mid or late seral forest, followed by burning. The purpose should be to create areas of high snag density, with snag retention for at least 5 years post-fire. There are no specific recommendations on how much area should be managed for black-backed woodpeckers, but guidance can be gleaned from an understanding of historic conditions. See the Wildlife Technical Report for details.

Conserve late seral habitat (VRUs 3, 4, 6, 7, 8): Pileated woodpeckers and Northern goshawks are the focus of this theme. A strategy of retaining greater than 600 acres of late seral forest (especially late seral grand fir forest) per 2,500 acres should be used. The 600 acres should be comprised of as large as blocks as possible (minimum size 50 acres), with all habitat grouped within a 1,000 acre circle. This translates to 24% late seral forest. Currently, 47% of the South Fork Canyon ERU is late seral forest.

Recreation

Themes - Lower: Provide developed recreation opportunities and Conserve scenic integrity. Upper: Conserve scenic integrity (all themes Very High Priority).

Background and Findings - From the Forest boundary to Elk City, the canyon is a spectacular, mostly unmodified forested landscape. Only the existence of the state highways, private developments and USFS facilities detract from the semiprimitive character through the corridor. Trail uses, wildlife viewing, and whitewater boating are the fastest growing activities. Developed and dispersed recreation activities are important. Only a few developed recreation sites are found outside this ERU in the subbasin. The area theme of ponderosa pine restoration can enhance these recreation and visual emphases.

Treatment Objectives - Existing facilities should be maintained and upgraded as needed. The recreation setting should be protected consistent with South Fork Clearwater River's identification as an eligible waterway for "recreation" determination in the Wild and Scenic Rivers System. A recreation plan for the corridor including a suitability study of river eligibility is needed.

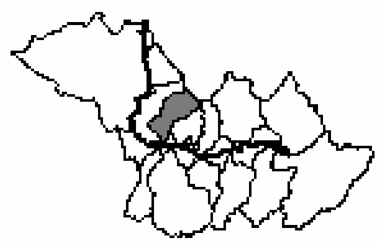
Roads

Theme - Lower and Upper: Maintain a core road system and reduce adverse effects throughout.

Background and Findings - State Highway 14 is the main access to the subbasin and to the communities of Golden, Elk City, Red River and Dixie. Forest and County arterial road systems feed into the State Highway throughout the length of the subbasin. Many of these arterial roads are located adjacent to or near major tributaties of the South Fork Clearwater River. Road effects include riparian encroachment and streamside sediment delivery as well as inducing risks to the aquatic environment from mass movements.

Treatment Objectives - Continuing efforts to work collaboratively with the Department of Transportation to mitigate the disposal of maintenance spoils along State Highway 14 should be pursued. Continuing maintenance along Forest roads is important, particularly keeping drainage functional.

Meadow Creek Ecological Reporting Unit



Area Themes - Lower Meadow: Restore Aquatic Processes and Restore ponderosa pine. Upper Meadow: Restore Aquatic Processes.

Location and Size - Meadow Creek ERU encompasses an area approximately 24,000 acres in size. The ERU extends north from the South Fork Clearwater River to an area near Corral Hill. See Map 7.

Aquatic

***Theme* -** Restore Aquatic Processes (High Priority)

***Background* -** Meadow Creek is a moderate size watershed (24,075 acres), with important aquatic values, that has had an extensive amount of management activity. It is composed of principally of ALTA 3 in the lower end, a large area of ALTA 4 (low elevation low relief hills) in the central portion of the watershed, and ALTA 21 (mountain uplands) in the upper watershed. There is a significant portion of ALTA 18 located in the center of the watershed at McComas Meadows (Map 6). Meadow Creek is located primarily in hydrologic zone 3 (low elevation breaklands), with zone 2 in the upper watershed.

Meadow Creek is considered to have a high habitat potential for steelhead and westslope, and a moderate potential for spring chinook and bull trout (Maps 33a, 34a, 35a, 36a).

There has been extensive management activity in Meadow Creek. Mining has not significantly effected stream/riparian function. There have been effects from grazing. Grazing impacts are recovering (Map 15). There has been about 7,700 acres of timber harvest in Meadow Creek (32% of the area), with about 1,300 acres of this in the RHCA, the highest density of RHCA harvest in the subbasin (Map 12). There are about 164 miles of existing road in the watershed (4.4 mi/sq mi), the highest road density in the subbasin, with about 45 miles of this being in the RHCA, the highest RHCA road density in the subbasin (Maps 13, 14). There are a high number of roads in Meadow Creek that encroach on stream/riparian function (Map 15). The management activity in Meadow Creek has been dispersed throughout the watershed; there is only a small area of low development (Map 21). The current ECA is 11% and the current sediment yield is 16% over natural base. The overall watershed condition in Meadow Creek is low (Map 30). The Forest Plan fish/water quality objective for this watershed is 80% in the lower 2/3, and 70% in the upper portion (Map 31). Meadow Creek is considered well below this objective condition (Map 32). Mainstem Meadow Creek is designated a water quality limited stream by the State of Idaho (Map 29).

***Findings* -** There has been considerable management activity in Meadow Creek. This activity has resulted in a change in stream/riparian processes, and alteration in the sediment regime in the upper watershed, where historic disturbances were infrequent. It is not clear how these activities have altered disturbance regimes in the lower watershed; however, these activities have reduced the habitat condition in these streams.

Spring chinook, steelhead, and westslope cutthroat are present in Meadow Creek. Brook trout are present in the mainstem channel below McComas Meadows. This watershed is considered a population stronghold for westslope cutthroat, a historic stronghold for steelhead, and an adjunct-degraded watershed for spring chinook and bull trout (Maps 33b, 34b, 35b, 36b).

***Recommendations/Treatment Objectives* -** The recommended aquatic theme for Meadow Creek is restore aquatic processes, high priority (Map 48). This watershed has important aquatic values, particularly for steelhead and westslope. The large amount of ALTA 4 in this watershed is a unique feature in the subbasin, and contributes greatly to the high aquatic potential. The restoration in this watershed needs to focus on the sediment regime, and areas where the stream/riparian processes have been altered. The sediment regime restoration needs to focus on the existing road system, along with other upland sediment sources. The stream/riparian process restoration needs to focus on the legacy effects in McComas meadows and the roads that encroach on streams.

The recommended area themes for Meadow Creek are aquatic restoration throughout the watershed, and restoration of ponderosa pine in the lower subdivision (Map 53). The road themes are focused on the reduction of effects from existing roads. In the upper watershed, a shift to a more ephemeral road system is proposed based on the vegetative setting and recommended treatment frequency. This should result in a reduction in overall road densities. In the lower watershed, a more permanent road system is envisioned based on the vegetative setting, and the restoration would be more focused on reducing effects from the existing roads versus removing them. However, given the amount of road in this area, there should also be opportunties to reduce overall road densities.

Vegetation

Themes - Lower: Restore ponderosa pine (High Priority). Upper: Conserve existing vegetation condition (Moderate Priority).

Lower Meadow Creek Background and Findings - This ERU includes the mostly steep lands along the River (VRU 3) and the lower elevation uplands influenced by the nearby canyon (VRU 4). In lower Meadow Creek, plant communities were historically shaped by low and mixed severity fire, and featured ponderosa pine and Douglas-fir, with some grand fir, western larch, and Pacific yew, and a minor amount of spruce. Bunchgrass was important on the warmest sites. Fire suppression, forest succession, and timber harvest have resulted in declines in open pine stands, and increases in grand fir and Douglas-fir. Significant areas of fire risk outside the historic range (Map 46) occur in this area, made more complex by intermingled land ownership and the nearby Forest boundary.

Lower Meadow Creek Treatment Objectives - Disturbance activities in subwatersheds as often as every 10 to 30 years may be appropriate in these VRUs. About 13,000 acres of VRU 3 and 4 are potentially suitable for pine restoration in this ERU.

Upper Meadow Creek Background and Findings - In Upper Meadow Creek, sites have more moisture (VRUs 7 and 10) and were more subject to infrequent mixed fire. Grand fir, Douglas-fir, Engelmann spruce, and Pacific yew were more important than ponderosa pine. Timber harvestentries have been traditionally dispersed, mostly clearcut, and more frequent than historical fire disturbance. Complex, multi-age old growth, diversity of patch size, and abundance of snags and down wood have been lost.

Upper Meadow Creek Treatment Objectives - Disturbance activities can occur in subwatersheds from 0 to 2 times in about 35 years in these VRUs to help recover watershed function and treatments scaled more in harmony with historic process. Working to maintain seral lodgepole pine and western larch on ridges, produce some early seral patches, maintain mostly complex stand structures on lower slopes, sustain old growth, provide snags in small patches or individuals, and provide greater variety of patch size comprise the theme in Upper Meadow Creek. About 11,000 acres of VRUs 7 and 10 are potentially suitable for conserving existing vegetation pattern.

Wildlife

Themes - Restore ponderosa pine (Very High Priority), Enhance Wildlife Security (Moderate Priority), and Conserve late seral habitat (Low Priority).

Background and Findings - Meadow Creek is comprised of two distinct grouping of wildlife habitats: the dry, ponderosa pine forest of Lower Meadow Creek, and the mesic mixed conifer forest of Upper Meadow Creek. Each is important to several wildlife species, most particularly flammulated owl (Lower Meadow) and pileated woodpecker and Northern goshawk (Upper Meadow).

Treatment Objectives - Restore ponderosa pine (VRUs 3 and 4), which is aimed at restoration of the historic open-grown fire-climax forest structure. The goal should be to create stands with an overstory of old growth (greater than 150 year old) ponderosa pine/Douglas-fir with multiple canopy layers, low tree density, moderate to low canopy closure, and moderate ground cover. The highest priority for such management are those stands that would result in the most immediate benefit to flammulated owls. Such stands are characterized as older than 60 years, with ponderosa pine forest types (or Douglas-fir forest types with a strong component of overstory ponderosa pine), are on ridgetops to midslopes, with slopes less than 45%, and are between 3600 and 6200 feet in elevation. Flammulated owl presence/absence surveys should be conducted before any timber harvest or prescribed burning is implemented in such stands, to help ensure that existing flammulated owl "clusters" would not be impacted.

Conserve late seral habitat (primarily VRUs 3, 4, 7): Pileated woodpeckers are the focus of this theme in Meadow Creek ERU, although fisher should also be considered. A strategy of retaining greater than 600 acres of late seral forest (especially late seral grand fir forest) per 2,500 acres should be used. The 600 acres should include blocks as large as possible (minimum size 50 acres), with all habitat grouped within a 1,000 acre circle. Currently, 52% of Meadow Creek is comprised of late seral forest.

Enhance wildlife security (all VRUs): This theme is focused on improving the availability of wildlife security for elk during the non-winter period. One of the Elk Habitat Units within this ERU is more than 5 points below objective. Site specific proposals to increase wildlife security should be examined in this area whenever recreation opportunities or road or trail changes are proposed.

Recreation

Themes - Lower: Provide roaded and trail recreation (Moderate Priority). Upper: Provide roaded recreation (Low Priority).

Background and Findings - The area is mostly used by hunters and campers from early archery through the late whitetail deer season. Some of the earliest logging on the Forest occurred in this area. In the 1960s, Meadow Creek (through the private meadows) was a popular fishing and camping area. Cattle grazing since then has degraded the stream channel and fishing has declined. In 1992, the Forest acquired McComas Meadows in a land exchange, with the expectation of restoring aquatic and vegetation conditions of the meadows. Some restoration has already been completed. The recreation importance of the McComas area will increase as aquatic and riparian conditions continue to improve through restoration efforts. The Elk City Wagon Road is a popular attraction where forest visitors experience the past by travelling a route used by miners and homesteaders in the late 1800s. Restoring ponderosa pine in the lower drainage and conserving old forest structures in the upper drainage is compatible with and should enhance recreation themes.

Treatment Objectives - Existing road and trail facilities should be maintained. Consideration should be given to developing additional dispersed sites and to protecting and interpreting historical features. Roaded recreation and motorized trail opportunities should be emphasized; particularly those areas associated with the Elk City Wagon Road, the Cougar ORV trail and roads near McComas Meadows. Development of dispersed sites around McComas should consider interpretation of logging history and Nez Perce Tribe cultural features.

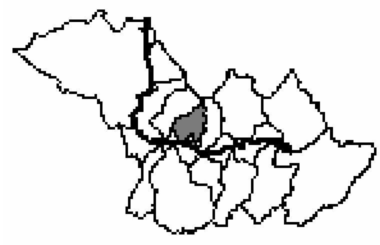
Roads

Themes - Lower: Maintain a core road system and reduce adverse effects throughout. Upper: Reduce adverse effects with an emphasis on reducing overall road densities.

Background and Findings - Portions of Meadow Creek have received intensive management in the past. This management has resulted in an existing road density of approximately 4.4 miles of road per square mile of land.

Treatment Objectives - Many of the existing roads are undriveable and the distribution of roads could be improved to be more efficient. The reduce road density theme is intended to selectively obliterate some roads having undesirable effects and allow for the repatterning of the transportation system to meet vegetative and recreation needs. Some streamside or riparian corridor roads should be obliterated. Arterial and Collector facilities such as roads 244, 648, and 1852 should remain. Reductions in total road miles of up to 35% may be appropriate over time.

Cougar-Peasley Creeks Ecological Reporting Unit



Area Themes - Lower Cougar-Peasley: Restore ponderosa pine. Upper Cougar Peasley: Conserve existing vegetation conditions and Conserve late seral habitat.

Location and Size - The Cougar-Peasley Creek ERU encompasses Cougar and Peasley Creek watersheds, an area approximately 17,000 acres in size. The ERU extends north from the South Fork Clearwater River to an area near China Point. See Map 7.

Aquatic

Theme - Restore Aquatic Processes (Moderate Priority)

Background - Cougar and Peasley Creeks are moderate sized (16,748 acres combined) watersheds that have had considerable management activity. These watersheds are composed predominately of ALTA 3 and 4, with some ALTA 21 in the upper ends of each (Map 6). These watersheds are predominantly in hydrologic zone 3.

The main channels of these watersheds are mostly B channel types, with higher gradient A channels near the mouth of Peasley and in the tributaries of both. These watersheds are rated as having a moderate habitat potential for steelhead and westslope, and a low habitat potential for spring chinook and bull trout (Maps 33a, 34a, 35a, 36a).

These watersheds have had considerable management activity. Historic mining and grazing have not influenced stream/riparian function. There has been about 1,750 acres (23 % of the area) of timber harvest in Cougar Creek and about 2,000 acres (22% of the area) of timber harvest in Peasley (Map 12). Of this total harvest in these two watersheds, about 1,000 acres have been in the RHCA; the second highest RHCA harvest density in the subbasin. There are 48 miles (4.0 mi/sq mi) of existing road in Cougar Creek and 55 miles (3.8 mi/sq mi) in Peasley (Maps 13, 14). Of this total, about 33 miles of existing road is in the RHCA; the second highest RHCA road density in the subbasin. There are sections of road in both of these watersheds that encroach on stream/riparian processes (Map 15). An area near the mouth of Cougar Creek and one area in upper Peasley have had low levels of development (Map 21). The current ECA for Cougar Creek is 12% and13% for Peasley Creek. The current sediment yields are 15% and 20% over natural base for Cougar and Peasley, respectively. The overall condition rating for these watersheds is low (Map 30). The Forest Plan fish/water quality objective for these watershed is 70% (Map 31). Currently, both creeks are considered well below this objective condition (Map 32). Both mainstem Cougar and Peasley Creeks are designated water quality limited streams by the State of Idaho (Map 29).

Findings - The Cougar and Peasley Creek watersheds have had significant levels of management activity. This has resulted in an alteration of disturbance regimes in the upper watersheds where fire and hydrologic disturbance events are less historically frequent. It is not known how this activity has affected the disturbance regimes in the lower watersheds. This activity has resulted in a reduction in aquatic habitat condition and habitat diversity in these watersheds from accelerated sediment yields.

Steelhead and westslope cutthroat are present in these watersheds. Brook trout have not been found in these watersheds. These watersheds are considered adjunct degraded habitat for all four species assessed (Maps 33b, 34b, 35b, 36b).

Recommendations/Treatment Objectives - The recommended aquatic theme for these watersheds is restore aquatic processes, moderate priority (Map 48). Based on the habitat potential of these watersheds, in comparison to other watersheds in the subbasin, restoration is not as important as others. This is not to say that restoration of these watersheds should not proceed. In conjunction with the other recommended themes for these watersheds, restoration should proceed if possible. The aquatic restoration should focus on the upland sediment sources, primarily the existing roads, in terms of both sediment regime and effects of these sources on habitat condition. Of particular importance are the roads in the RHCA, both streamside and on landslide prone terrain.

Vegetation

Themes - Lower: Restore ponderosa pine (High Priority). Upper: Conserve existing vegetation condition (High Priority).

Lower Cougar-Peasley Creek Background and Findings - The area includes the mostly steep lands along the South Fork Clearwater River (VRU 3) and the lower elevation uplands influenced by the nearby canyon (VRU 4). In these lower areas, plant communities were historically shaped by low and mixed severity fire, and featured ponderosa pine and Douglas-fir, with some grand fir, western larch, Pacific yew, and a minor amount of spruce. Bunchgrass was important on the warmest sites. Significant areas of fire risk outside the historic range (Map 46) occur in this area. Fire suppression, forest succession, and timber harvest have resulted in declines in open ponderosa pine stands, and increases in grand fir and Douglas-fir.

Lower Cougar-Peasley Creek Treatment Objectives - Disturbance activities in subwatersheds as often as every 10 to 30 years may be appropriate in these VRUs. About 9,700 acres of VRUs 3 and 4 are potentially suitable for the ponderosa pine restoration within this ERU.

Upper Cougar-Peasley Creek Background and Findings - The area has more moisture (VRUs 7 and 10) and was subject to more infrequent mixed fire. Grand fir, Douglas-fir, Engelmann spruce, and Pacific yew are more important than ponderosa pine in this area. Harvest has been traditionally dispersed, mostly clearcut, and more frequent than historical fire disturbance. Complex, multi-age old growth, diversity of patch size, and abundance of snags and down wood have been lost.

Upper Cougar-Peasley Creek Treatment Objectives - Disturbance activities can occur in subwatersheds from 0 to 2 times in about 35 years to help recover watershed function and treatments scaled more in harmony with historic process. Treatments should include maintenance of seral lodgepole pine and western larch on ridges, production of some early seral patches, maintenance of complex stand structures, sustaining old growth, providing snags in small patches or individuals, and providing greater variety of patch size. About 7,000 acres of VRUs 7 and 10 are potentially suitable for conserving existing vegetation pattern.

Wildlife

Themes - Restore ponderosa pine (Very High Priority), Produce early seral habitat (Very High Priority), Conserve late seral habitat (Low Priority).

Background and Findings - Cougar-Peasley Creek's upper and lower ends provide two different habitats. The upper end is characterized by mixed conifer forest containing extensive late seral habitat, of the type favored by pileated woodpeckers. The lower end of the ERU supports ponderosa pine forest, much of which has been burned or harvested within the last 30 years. The brush fields and bunchgrass slopes in Lower Cougar-Peasley Creeks are heavily used by wintering elk. This area supports the only known flammulated owl cluster in the subbasin. Future vegetation management in the Granite Creek and Little Medicine Creek drainages should take particular care to avoid detrimental impacts to these birds.

Treatment Objectives - The Restore ponderosa pine theme (VRUs 3 and 4) calls for vegetation management to focus on creating stands with an overstory of old growth (greater than 150 year old) ponderosa pine/Douglas-fir with multiple canopy layers, low tree density, moderate to low canopy closure, and moderate ground cover. Highest priority for treatment should be those stands that are older than 60 years, have a ponderosa pine forest type (or Douglas-fir forest types with a strong component of overstory ponderosa pine), are on ridgetops to midslopes, have slopes less than 45%, and are between 3600 and 6200 feet in elevation.

Produce early seral habitat (VRUs 3, 4, 12, 16): Currently 6% of Cougar-Peasley Creek ERU is in early seral habitat, with an additional 1% of fire-climax ponderosa pine habitat. This theme would create additional habitat for wintering elk by either fire or timber harvest. To allow maximum elk use of forage, no clearcuts should be greater than 1000 feet wide.

Conserve late seral habitat (VRUs 3, 4, 6, 7, 8): This theme should focus on the mixed conifer forests characteristic of the ERU's upper portion, and be centered on benefiting pileated woodpeckers and fisher.

This could best be done by retaining greater than 600 acres of late seral forest (especially late seral grand fir forest) per 2,500 acres. The 600 acres should be comprised of the largest blocks possible (minimum size 50 acres), with all habitat grouped within a 1,000 acre circle. Currently 66% of this ERU is comprised of late seral forest.

Recreation

Themes - Lower and Upper: Provide roaded and trail recreation (Moderate Priority).

Background and Findings - Most of the area has road access. Existing recreation use is low compared to other parts of the subbasin. Most use occurs during the fall and winter big game hunting seasons. Old brushy burns, pine and fir plantations, and scattered old ponderosa pine with stringers of old grand fir characterize this area. The Cougar ORV trail provides access through mature pine stands and is connected to the Big Burn Point and the McComas ORV trail systems. Existing recreation use patterns are dependent on having some roads and trails opened to motorized use. Restoring ponderosa pine in lower Cougar is fully compatible with the emerging importance of trail uses.

Treatment Objectives - ORV trail maintenance and the development of dispersed hunting campsites and trailheads should be emphasized. The Cougar ORV trail could be improved by incorporating existing restricted roads into a more complete loop system.

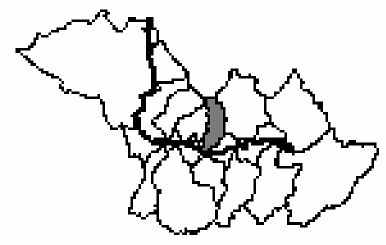
Roads

Themes - Lower: Maintain a core road system and reduce adverse effects throughout. Upper: Reduce adverse effects with an emphasis on reducing overall road densities.

Background and Findings - Portions of the upper reaches of these drainages have received intensive management in the past. This management has resulted in road densities of nearly 4 miles per square mile (some of which are impassable) in these drainages.

Treatment Objectives - The reduce road density theme is intended to selectively obliterate some roads that are having adverse effects. The road system in the lower reaches of these drainages should in comparison have a higher percentage of the miles retained through time. This is correlated with the more frequent vegetative treatment needs. Peasley Creek road #469 merits an updated analysis to determine the most effective methods to mitigate detrimental aquatic effects from this roadway.

Silver Creek Ecological Reporting Unit



Area Themes - Lower Silver: Restore ponderosa pine. Upper Silver: Conserve existing vegetation conditions.

Location and Size - Silver Creek ERU encompasses an area approximately 16,000 acres in size. The ERU extends north from the South Fork Clearwater River to an area near Pilot Rock-Pilot Knob. See Map 7.

Aquatic

***Theme* -** Conserve Existing Aquatic Function (Moderate Priority)

***Background* -** Silver Creek is a moderate sized (16,377 acres), naturally barriered watershed that currently supports a strong brook trout population. A short section below the barrier supports incidental use by steelhead, westslope, and bull trout. The Silver Creek watershed is composed of low elevation stream breaklands and rolling hills in the lower half, and primarily mountain uplands in the upper part (Map 6). The hydrologic zones for Silver Creek are zone 3 for the lower half, and both zone 1 and 2 in the upper part. The mainstem of Silver Creek is a B channel type, with most of the tributary streams being A channels.

This watershed has had limited management activity. There was no significant historic mining in this watershed (Map 15). There has been about 1,000 acres of timber harvest (7% of the area); about 25% of that in the RHCA, principally in the lower end of the watershed (Map 12). There are about 30 miles of existing road in the watershed (1.1 mi/sq mi); about 6 miles of that are in the RHCA (Map 13). The upper three-quarters of this watershed has had very little development (Map 21). The current ECA for Silver Creek is 5%, and the current sediment yield is 3% over natural base. The overall watershed condition for this ERU is considered high (Map 30). The Forest Plan fish/water quality objectives for this watershed are 80% in the lower portion and 100% in the upper (Map 31). The current condition of Silver Creek is considered to be at this Forest Plan objective (Map 32).

***Findings* -** Silver Creek is not accessible to spring chinook, steelhead, bull trout, and westslope above the naturally barriered section (a steep section with a series of waterfals and cascades). The current strong population of brook trout in this area makes transplanting of westslope cutthroat above the barrier impractical at this time. Silver Creek provides rearing habitat for these aquatic species, primarily low flow cold water refuge habitat when temperatures in the South Fork mainstem are high. Additionally, Silver Creek provides cold, high quality water to the South Fork mainstem. Silver Creek constitutes a high quality contributing area for the South Fork, and the aquatic species assessed (Maps 33b, 34b, 35b, 36b).

***Recommendations/Treatment Objectives* -** The recommended aquatic management theme for Silver Creek is to conserve the existing aquatic function, with a moderate priority (Map 48). It is important that the current quality of contributed water from Silver Creek be maintained, both in terms of the rearing habitat in Silver Creek, and the conditions in the South Fork mainstem. The value of this low flow, cold water refuge habitat in Silver Creek is high. Conservation of this aquatic function would probably not require active management, but would require careful planning of other management activities.

The aquatic theme is very compatible with the other recommended themes for this area. In the upper watershed, the vegetative theme of conserving existing vegetative condition, the road theme of deferring new roads, the wildlife themes of providing late seral habitat and enhancing wildlife security, and the recreation theme of providing trail recreation should all result in conservation of existing aquatic function. In the lower watershed, the vegetative theme is focused on the restoration of ponderosa pine, and the road theme recognizes that additional roads will be needed to achieve this objective. This area has a high sensitivity, but with careful placement of roads and timber harvest treatments, along with the use of aerial logging systems in higher risk areas, these objectives can be met while also achieving the aquatic conservation objective.

Vegetation

Themes - Lower: Restore ponderosa pine (High Priority). Upper: Conserve existing vegetation conditions (Low Priority).

Lower Silver Creek Background and Findings - This ERU includes the mostly steep lands along the South Fork Clearwater River (VRU 3) and the lower elevation uplands influenced by the nearby canyon (VRU 4). In these areas, plant communities were historically shaped by low and mixed severity fire, and featured ponderosa pine and Douglas-fir, with some grand fir, western larch, and Pacific yew, and minor amounts of spruce. Bunchgrass was important on the warmest sites. Fire suppression, forest succession, and timber harvest have resulted in declines in open pine stands, and increases in grand fir and Douglas-fir. Significant areas of fire risk outside the historic range (Map 46) occur in this area.

Lower Silver Creek Treatment Objectives - Disturbance activities in subwatersheds as often as every 10 to 30 years may be appropriate in these VRUs. About 5,900 acres of VRU 3 and 4 potentially suitable for the ponderosa pine restoration theme occur in this ERU.

Upper Silver Creek Background and Findings - The area has more moisture (VRUs 7 and 10) and was subject to more infrequent mixed fire, when compared to the lower portion of the drainage. Grand fir, Douglas-fir, Engelmann spruce, and Pacific yew were more important than ponderosa pine. In these areas, harvest has been negligible. Complex, multi-age old growth and down wood have been maintained or increased. Diversity of patch size, early seral stages and seral species are being lost.

Upper Silver Creek Treatment Objectives - Disturbance activities (which may be limited to fire in this area) can occur in subwatersheds from 0 to 2 times in about 35 years to help recover watershed function and treatments scaled more in harmony with historic process. Treatments should include: maintenance of seral pine, aspen, whitebark pine and western larch on ridges, production of some early seral structural stages, maintenance of mostly complex stand structures, sustaining old growth, providing snags in small patches or individuals, and providing greater variety of patch size. Coordination with the Nez Perce Tribe to ensure that activities are compatible with preservation of cultural values will be important. About 9,300 acres of VRU 7 and 10 potentially suitable for conserving existing vegetation pattern, occur in this ERU. About 1,000 acres of VRU 1 and 9 potentially suitable for whitebark pine restoration or repatterning of vegetation also occur in this ERU.

Wildlife

Themes - Produce early seral habitat (Very High Priority), Restore ponderosa pine (High Priority), Conserve late seral habitat (Low Priority), Enhance wildlife security (Moderate Priority).

Background and Findings - Silver Creek's most unique feature is the extensive unroaded habitat in the upper half of the drainage. This area likely acts as a refugia to disturbance-sensitive wildlife. Upper Silver Creek also provides extensive late seral habitat for American marten, boreal owl (background information available in wildlife project file), and fisher. In Lower Silver Creek, ponderosa pine habitat supports relatively high numbers of wintering elk, and has potential for flammulated owls.

Treatment Objectives - Produce early seral habitat (primarily VRUs 3, 4, 12): The purpose of this theme is to benefit wintering elk, which could be accomplished by either fire or timber harvest. To allow maximum elk use of forage, no clearcuts should be greater than 1000 feet wide. The goal should be to maintain 40% of VRUs 3, 4, and 12 in early seral or fire-climax ponderosa pine habitat. Currently, 14% of the suitable VRUs in Silver Creek support early seral habitat and 3% provide fire-climax ponderosa pine habitat.

Restore ponderosa pine (VRUs 3 and 4): This theme recommends restoration of the open-grown forest structure that once typified fire-climax ponderosa pine. This would benefit wintering elk, and may improve habitat conditions for flammulated owls. In general however, the ponderosa pine habitat in Silver Creek is naturally more dense than what is considered optimum flammulated owl habitat. In this ERU therefore, the emphasis should be given to providing additional elk winter range. This would require only minor revisions from those emphasizing flammulated owls, and include: prioritizing efforts to first treat south aspects below 4,000 feet with the primary focus on the understory (rather than the overstory). The specific goals should be to produce dense brush fields interspersed with small grass openings. Clumps (greater than 40 acres in size) of dense vegetation (defined as greater than 40 feet tall and greater than 70% canopy cover) should be retained every 0.5 mile across the landscape.

Conserve late seral habitat (VRUs 1, 2, 3, 4, 7, 9,10): Silver Creek provides high quality habitat for several species which rely on late seral habitat. The species which require the greatest extent of late seral habitat are American marten and fisher. Guidelines for maintaining these animals center around managing late seral forest habitat at its greatest historical extent, which is estimated at approximately 37% for the Silver Creek ERU. Currently, 70% of this ERU supports late seral habitat, which explains why a low priority was placed on this important theme.

Enhance Wildlife Security (VRUs 1, 2, 3, 4, 7, 9,10): Although Upper Silver Creek is considered an important refugia for disturbance sensitive wildlife, Lower Silver Creek is not. Seasonal restrictions on motorized access into Lower Silver Creek are considered adequate for elk, but allow snowmobile use and so may result in increased access to marten trappers, increasing the risk of accidental trapping of fisher. Currently, the perceived impact of such trapping is slight. The main emphasis of this theme therefore, is to recommend against the creation of new snowmobile loops in the ERU.

Recreation

Themes - Upper and Lower: Provide Trail Recreation (Moderate Priority).

Background and Findings - Most of Silver Creek is either unroaded or closed to motorized road and trail access. The area is known for its cultural significance to the Nez Perce Tribe and for its nonmotorized big game hunting opportunities. Recreation use is low, except during the fall hunting season. The vegetation and wildlife themes compliment the nonmotorized trail theme.

Treatment Objectives - Emphasis should be placed on providing nonmotorized trail opportunities and protecting the cultural significance of Pilot Rock/Pilot Knob Area. Background scenic rehabilitation treatments should be considered for seen areas from Pilot Rock.

Roads

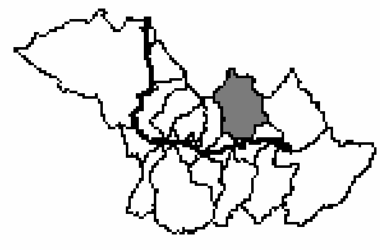
Themes - Lower: Develop and maintain the road system. Focus on maintaining the existing road system. Upper: Defer new roads.

Background and Findings - Management activities requiring road access beyond existing levels are not anticipated for upper Silver Creek. Additions to the existing road system in lower Silver creek are anticipated. These would be local access roads designed to meet vegetation management needs.

Treatment Objectives - Most of the existing road systems in Lower Silver Creek are either new or have been recently reconstructed. Periodic scheduled maintenance should be required.

> **Note:** Most of Upper Silver Creek ERU has special cultural and religious significance to the Nez Perce Tribe. The Forest will continue consulting with the Tribe on any proposed activities in this area as well as all other areas on the Forest. The current management area standards such as no timber harvest or road construction are in effect for this area.

Newsome-Leggett Creek Ecological Reporting Unit



Area Themes - Restore Aquatic Processes

Location and Size - Newsome-Leggett Creek ERU encompasses an area approximately 48, 000 acres in size. The ERU extends north from the South Fork Clearwater River to an area near Hamby Saddle. See Map 7.

Aquatic

***Theme* -** Restore Aquatic Processes (Very High Priority)

***Background* -** The Newsome/Leggett watersheds (47,809 acres) have high aquatic potential, with current conditions a result of the changed disturbance regimes in this watershed. The Newsome/Leggett watersheds are composed primarily of mid-upper elevation low relief hills (ALTA 6), with a ring of mountain uplands (ALTA 21) on three sides. There are small patches of steep breaklands (ALTA 3), mostly along the mainstem channel. Narrow alluvial valleys (ALTA 18) are found along portions of the mainstem and major tributary streams (Map 6). This watersheds lie primarily in hydrologic zone 2, characterized by a mid-period snowmelt run-off regime.

The mainstem channel in Newsome is mostly a B3/B4 channel type. The tributary streams have a wide range of conditions, ranging from A through E channel types, with most of the lower gradient, higher quality fish habitat (B and C channel types) occurring in conjunction with ALTA's 18 and 6. The Newsome/Leggett ERU has a very high habitat potential rating for spring chinook and steelhead, focused on the higher order streams in the lower watershed (Map 34b, 35b). This habitat potential actually extends higher up into this watershed than these maps show. This watershed has a very high habitat potential rating for bull trout and westslope cutthroat, with the spawning habitat located in the upper watershed, and the lower watershed providing important subadult/adult rearing habitat for migratory fish (Map 33a, 36a).

The Newsome/Leggett area has had a considerable amount of management activity. Most of the mainstem channel, and some tributaries, had historic mining that affected stream and riparian processes (Map 15). Additionally, the road that parallels the mainstem encroaches on the stream/riparian processes in sections (Map 15). There has been about 8,000 acres of timber harvest in the Newsome watershed (19 % of the area); about 1,300 acres of this have been in the RHCA (Map 12). There are about 220 miles of existing road in Newsome (3.3 mi/sq mi); 55 miles of this being in the RHCA (Map 13, 14). There are large areas of the watershed that have had a low amount of development (about 1/3 of the watershed). These areas are spread throughout the watershed (Map 21). The current ECA for Newsome is 7%, while the current sediment yield is 13% over natural base. The overall condition rating for the Newsome watershed is low, while the rating for Leggett is moderate (Map 30). The Forest Plan fish/water quality objective for Newsome is 90% and 80% for Leggett (Map 31). Newsome is considered well below this objective condition; Leggett is considered below its objective condition (Map 32). There are many water quality limited streams in the Newsome Creek drainage. Leggett Creek has also been designated water quality limited by the State of Idaho (Map 29).

***Findings* -** Aquatic processes and conditions in this ERU have been altered from historic, primarily the stream/riparian and sediment regimes. The former is primarily associated with historic mining of in the mainstem channel, historically some of the most valuable fish habitat in the subbasin (along with the other tributary mainstems), and streamside roads. The change in sediment regimes is associated with the change from an infrequent disturbance regime to a frequent disturbance (Figure 3.4), and effects of stream/riparian activities, and the road system.

The aquatic habitat condition and the population dynamics of aquatic species have been influenced by these changes in disturbance regime. There has been a reduction in habitat condition based on the change in disturbance frequency, and the connectivity of the watershed has been reduced from the changes in the habitat condition in the mainstem.

Spring chinook, steelhead, bull trout, and westslope cutthroat are present in these watersheds. They remain widely distributed (bull trout being somewhat more restricted in distribution), while their abundance is believed to have declined. Of particular concern is the apparent loss of large migratory bull trout and westslope. Newsome/Leggett is considered a historic stronghold for all four fish species assessed (Maps 33b, 34b, 35b, 36b).

Recommendations/Treatment Objectives **-** The recommended aquatic theme for Newsome/Leggett is restoration of aquatic processes, with a very high priority (Map 48). The high aquatic potential of this watershed makes it an important watershed to restore. Restoration of this watershed is important to stabilize existing populations, along with providing a future population source area. The focus of aquatic restoration needs to be the sediment regime and the stream/riparian regime of the mainstem channel. To accomplish the first, there would need to be a change in the disturbance regime for this watershed, and a decrease in the effects of the existing roads.

The second component in aquatic restoration needs to focus on the mainstem channel. The restoration of the mainstem channel needs to focus on hydrologic and riparian process, with aquatic habitat being created as a result. Past restoration efforts in this channel were successful where they re-established hydrologic function, and largely unsuccessful (with the exception of providing cover) in areas where hydrologic function was not re-established. Treatment objectives include increased pool volume and pool depth, increased role of woody debris in the channel, increased complexity and diversity of habitat types. This restoration would provide increased habitat potential for steelhead and spring chinook, along with subadult/adult rearing habitat for bull trout and westslope cutthroat in the upper basin. Restoration of this channel would greatly improve the connectivity both within the watershed and with the rest of the subbasin.

The aquatic restoration in this watershed needs to proceed as rapidly as possible, due to the declining populations of aquatic species at risk. The primary component in this restoration should be a detailed analysis of the existing road system, and the development of a transportation plan that considers the aquatic, vegetative, recreational, and other important considerations. This planning should be completed through a EAWS for the watershed (scheduled to be completed in 1998), which will allow for the higher resolution analysis necessary to implement the strategies described here.

The restoration of aquatic processes in this watershed can be achieved fairly rapidly, if the work necessary to bring about this restoration is accomplished. The impacts in this watershed are not evenly distributed. Large portions of the watershed have not been impacted significantly, and these areas correspond to entire tributary subwatersheds in several cases. The stream channels in this watershed are fairly resilient and will respond quickly, including the mainstem channel. Aquatic species are present, with some locally high densities, to serve as source populations for rebuilding the restored habitats. Without active restoration, the stream/riparian processes in this watershed will be restored only over very long time frames, particularly the mainstem channel.

The recommended vegetative theme for the lower portion of the watershed is the restoration of vegetative pattern. This shift in vegetative treatment pattern, along with the need for aquatic restoration, suggest a shift to a more ephemeral road system. This conversion in the type of road system is essential to achieving the recommended aquatic restoration. In the upper watershed, the vegetative theme is the conservation of existing vegetation conditions. While there is not a need for large vegetative treatments in this area, there are opportunities for vegetative treatments in association with the road density reductions and aquatic restoration work in this upper subdivision.

Vegetation

Themes - Lower: Restore vegetation pattern (Moderate Priority). Upper: Conserve existing vegetation condition (Low Priority).

Lower Newsome-Leggett Creek Background and Findings **-** The area has gentle to moderate slopes subject to infrequent stand replacing and mixed fire (VRU 6). Lodgepole pine and western larch were more important than ponderosa pine. In these areas, harvest entries have been traditionally dispersed, mostly clearcut, and more frequent than historical fire disturbance. Diversity of patch size, and abundance of snag patches have been lost.

Lower Newsome-Leggett Creek Treatment Objectives - Disturbance activities can occur in a subwatershed no more than once in about 35 years, to help recover watershed function and treatments scaled more in harmony with historic process. Work often within existing sale areas to reconfigure disturbance patterns, produce some early seral stages, provide snag patches, and greater variety of patch size while retaining some overstory western larch, Douglas-fir, and grand fir. About 13,500 acres of VRU 1, 2, and 6 potentially suitable for the repatterning vegetation theme occur in this ERU.

Upper Newsome-Leggett Creek Background and Findings - The area has more moisture (VRUs 7 and 10) and was subject to more infrequent mixed fire than the lower sections. Grand fir, Douglas-fir, Engelmann spruce, and Pacific yew were more important than lodgepole pine. In these areas, harvest has been extensive, traditionally dispersed, mostly clearcut, and more frequent than historical fire disturbance. Complex, multi-age old growth, diversity of patch size, and abundance of snags and down wood have been lost.

Upper Newsome-Leggett Creek Treatment Objectives - Disturbance activities in a subwatershed can occur from 0 to 2 times in about 35 years to help recover watershed function and treatments scaled more in harmony with historic process. Treatments should include maintenance of seral lodgepole pine and western larch on ridges, production of some early seral structural stages, maintenance of mostly complex stand structures, sustaining old growth, providing snags in small patches or individuals, and providing greater variety of patch size. Botanically significant wetlands with boreal species like sundew and cottongrass occur in Sing Lee Creek and Pilot Creek. These are a high priority for protection from events that would threaten their persistence, including grazing, excavation or extensive conifer encroachment. About 29,000 acres of VRU 7 and 10 potentially suitable for conserving existing vegetation pattern occur in this ERU. About 2,700 acres of VRU 1 and 9 potentially suitable for whitebark pine restoration occur in this ERU.

Wildlife

Themes - Conserve late seral habitat (Moderate Priority), Enhance wildlife security (Moderate Priority).

Background and Findings - Based on the elevation and available habitat types, and forest types, this ERU has great potential for American marten, Northern goshawks, and fishers. All of these species are associated with late seral forest. Extensive past timber harvest and turn-of-the-century wildfires however, have limited the availability of late seral habitat within the drainage. This makes the future conservation of such forest types a wildlife priority.

Treatment Objectives - Conserve late seral habitat (primarily in VRUs1, 2, 3, 6, 7, 9, 10): Theme guidelines for this ERU are based on managing late seral forest habitat at its greatest historical extent, which is estimated at approximately 34%. Currently, 33% of the ERU supports late seral habitat.

Enhance Wildlife Security (VRUs 1, 2, 3, 4, 7, 9,10): This theme is aimed at benefiting furbearers such as fisher and American marten. At present, only 10% of the drainage has sufficient furbearer security due to high open road densities. The current known impact of trapping however, is slight. Therefore, the main emphasis of this theme is to recommend against a net gain in snowmobile access in this ERU.

Recreation

Themes - Upper and Lower: Provide roaded recreation (Moderate Priority).

Background and Findings - This ERU was extensively harvested in the 1960's and 1970's. Newsome Townsite, the Elk City Wagon Road, stands of big grand fir and Pacific Yew, dredge mining along Newsome Creek and large clearcuts are things people associate with this drainage. Scenic integrity is important from viewpoints along the Elk City Wagon Road. Fall big game hunting (elk, moose) and dispersed camping along Newsome Creek through the summer are popular. The Elk City Wagon Road and Newsome Townsite are historically significant. The Elk City Wagon Road and boundary road (road 464) is a popular snowmobile route from Clearwater to Elk City. In addition, ORV use (especially 4-wheelers) is increasing and causing tread damage to the Nugget Point and Upper Newsome trails.

Treatment Objectives - The emphasis should be on developing dispersed campgrounds, picnic sites and parking areas and interpreting the Elk City Wagon road and Newsome-Leggett mining history. Vegetation treatments in the Newsome drainage should also consider background scenic objectives from

Pilot Rock. Additional planning is needed for dispersed sites and interpretive facilities, trail access and to mitigate effects of increasing motorized trail use.

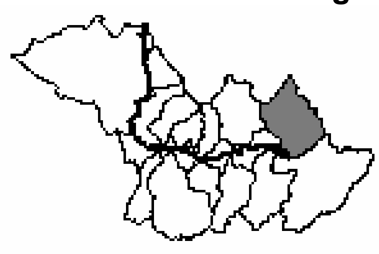
Roads

Theme - Lower and Upper: Reduce adverse effects with an emphasis on reducing overall densities.

Background and Findings - Much of Newsome Creek has received intensive management and mineral activity in the past. Approximately 3.3 miles of road per square mile of land currently exist in this drainage. Many of these roads are impassable and portions of the road system will not be needed in the future.

Treatment Objectives - The reduce road density theme would allow for the selective obliteration of road segments over time and allow for the repatterning of the transportation system. Streamside roads and upland stream crossings should be the focus of obliteration efforts. Arterials, collectors, most gravel surfaced local roads, roads that access mineral claims and private holdings, and principal recreation routes such as the Elk City Wagon road would be retained. Overall reductions in densities of up to 35% may be achievable over time.

American River Ecological Reporting Unit



Area Theme - Upper and Lower American River: Restore Aquatic Processes

Location and Size - American River ERU encompasses an area approximately 59,000 acres in size. The ERU extends from the confluence of the South Fork Clearwater River near Elk City to an area near Beargrass Mountain. See Map 7.

Aquatic

***Theme* -** Restore Aquatic Processes (High Priority)

***Background* -** American River is a large watershed (58,612 acres) with important aquatic values. The watershed is almost entirely composed of mid to upper elevation low relief hills and alluvial valleys (ALTA's 6, 18), with some mountain uplands (ALTA 21) on the western and eastern edges (Map 6). This watershed is located in hydrologic zone 2, characterized by mid-period snowmelt and moderate to low gradient channels.

The stream channels in this watershed are predominately low to moderate gradient B and C channel types, with higher gradient channels in the mountain uplands. Along with Red River, this watershed has a large amount of mid to upper elevation alluvial valleys (ALTA 18), and these features are spread more evenly throughout the watershed than is typical of the subbasin, where this ALTA is a linear feature along the tributary mainstem. ALTA 18 is composed predominately of C channel types.

American River has a high to very habitat potential for aquatic species. Spring chinook habitat potential is very high in lower American River in the higher order low gradient streams in ALTA 18 (Map 34a). Very high potential westslope cutthroat habitat exists throughout the watershed, with the higher order streams providing high potential subadult/adult rearing habitat (Map 36a). Steelhead habitat potential is rated as high for this watershed (Map 35a). Bull trout habitat potential in this watershed is rated as high, with the higher order channels in the lower watershed constituting important subadult/adult rearing habitat (Map 33a).

American River has been significantly effected by human activity. Historic mining occurred along significant portions of the higher order streams in the lower basin (Map 15). Grazing has affected stream/riparian processes (Map 15). There have been about 8,000 acres of timber harvest in the watershed (14% of the area); about 925 acres of this has been in the RHCA (Map 12). There are about 200 miles of existing roads in the watershed (2.3 mi/sq mi); about 60 miles in the RHCA (Maps 13, 14). Some sections of road encroach on stream/riparian process (Map 15). About half of this watershed is in areas of low development (Map 21). The current ECA for this watershed is 10%, and the current sediment yield is 14% over natural base. The overall condition for this watershed is considered low, with some subwatersheds considered moderate condition (Map 30). The Forest Plan fish/water quality objective for American River is 90% (Map 31). The current condition is below this objective condition (Map 32). A large number of the streams in this watershed have been designated as water quality limited streams by the State (Map 29). Big and Little Elk Creeks are part of the Elk City municipal watershed.

***Findings* -** There has been a departure from historic disturbance regimes in this watershed, primarily the stream/riparian and sediment processes. Stream and riparian processes have been altered principally from historic dredge mining, along with road encroachment and grazing effects. These activities have affected channel pattern, floodplain connectivity, and habitat conditions. The alteration in sediment regimes is a change from infrequent, large scale disturbance events to frequent disturbances (Figure 3.4). These changes are significant in terms of aquatic processes and aquatic species. The moderate to low gradient channels of this watershed were historically affected by large infrequent disturbance events, primarily fire, but there were long periods of stability during which these channels recovered and provided high quality habitat conditions. Fish populations in this watershed were historically interconnected, due to the highly branched nature of the watershed, with high potential for refounding or strengthening populations following disturbance/recovery events. This population dynamic was dependent on the high quality areas acting as refounding sources. The alteration in disturbance regime has affected habitat condition, while the population levels in the watershed have been affected by factors both within and outside the watershed. The viability of fish populations in this watershed, including their resilience to natural disturbance events, has been reduced as a consequence of this alteration of disturbance regimes.

Spring chinook, steelhead, westslope cutthroat and bull trout are all present in the American River watershed. Their distribution is widespread, with the exception of bull trout for which the distribution is not well known. Brook trout are also present in this watershed and are widely distributed. Spring chinook and steelhead abundance is low. Westslope cutthroat populations vary, with some high density areas. The higher densities of cutthroat appear to be correlated with undeveloped areas in American River. There are very few large-sized migratory cutthroat. Migratory bull trout are present in American River, although at low levels. The extent of resident bull trout in American River is not well known. The interagency bull trout study in the South Fork Clearwater River will be inventorying American River in 1998. This study should provide a better understanding of bull trout distribution and abundance. However, it does appear that the number of bull trout in American River is low, with very few larger fish being present. American River is considered a historic stronghold for all four of these fish species (Maps 33b, 34b, 35b, 36b).

***Recommendations/Treatment Objectives* -** The aquatic theme for American River is restore aquatic processes - high priority (Map 48). This watershed is important for aquatic species at risk, particularly spring chinook and westslope cutthroat. This watershed is rated lower than others in the upper subbasin based on: 1) the bull trout and steelhead habitat is lower in this watershed, 2) the belief that the current population of bull trout in this watershed is lower than others in the upper subbasin, and 3) the complexities of multiple land ownership within watersheds.

Aquatic restoration in this watershed needs to focus on stream and riparian processes, the distrubance regime and sediment effects. A detailed analysis of the existing stream/riparian processes in degraded reaches needs to be completed to understand the legacy effects, and options for re-establishing this stream/riparian function. The evaluation of disturbance regimes and sediment needs to focus on the existing road system, and the development of a transportation plan that incorporates vegetative treatment needs, recreation needs, and aquatic restoration objectives. It is recommended that this detailed analysis be completed through an EAWS.

The vegetation themes for this watershed are the restoration of vegetative pattern in the lower subdivision and conservation of existing vegetative condition in the upper area. Neither of these two themes carries a high priority for vegetative treatment. The reshaping of both the vegetative and aquatic pattern of disturbance in this area will mean the conversion from a permanent type road system to a more ephemeral road system for vegetative treatment, along with the maintenance of permanent access roads for public and administrative use. In the conversion to a more ephemeral system, the emphasis should be to decrease the total amount of road.

This watershed has a relatively large amount of non-national forest administered land, in the Elk City Township. A good portion of this area is BLM administered, along with state and private. The restoration on the National Forest lands should proceed as a broad based partnership, along with any other necessary restoration efforts in this part of the watershed. The time necessary to develop a restoration partnership between the individuals, agencies, businesses, and other groups in this watershed should be taken prior to initiation of a large-scale restoration effort on the National Forest. This watershed offers a unique opportunity for a public/private partnership-based restoration program.

Vegetation

***Themes* -** Lower: Restore vegetation pattern (Moderate Priority). Upper River: Conserve existing vegetation (Low Priority).

***Lower American River Background and Findings* -** Much of the area has gentle to moderate slopes subject to infrequent stand replacing and mixed fire (VRU 6). Lodgepole pine and western larch were more important than ponderosa pine. In these areas, harvest entries have been traditionally dispersed, mostly clearcut, and more frequent than historical fire disturbance. Diversity of patch size, and abundance of snag patches have been lost. Extensive harvest and residential development have occurred in the Elk City Township.

Lower American River Treatment Objectives - Disturbance activities should occur in a subwatershed no more than once in about 35 years, to help recover watershed function and treatments scaled more in harmony with historic process. Work should concentrate within existing sale areas to reconfigure disturbance patterns, produce some early seral stages, provide snag patches, and greater variety of patch size while retaining some overstory western larch, Douglas-fir, and grand fir areas. About 16,000 acres of VRU 6 potentially suitable for the repatterning vegetation theme occur in this ERU.

Upper American River Background and Findings - The area has more moisture (VRUs 7 and 10) and was subject to more infrequent mixed fire, when compared to the lower portion of the drainage. Grand fir, Douglas-fir, Engelmann spruce, and Pacific yew were more important than lodgepole pine. In these areas, harvest entries have been extensive, traditionally dispersed, mostly clearcut, and more frequent than historical fire disturbance. Complex, multi-age old growth, diversity of patch size, and abundance of snags and down wood have been lost.

Upper American River Treatment Objectives - Disturbance activities in a subwatershed should occur from 0 to 2 times in about 35 years to help recover watershed function and treatments scaled more in harmony with historic process. Treat to maintain seral lodgepole pine and western larch on ridges, produce some early seral patches, maintain mostly complex stand structures, sustain old growth, provide snags in small patches or individuals, and provide greater variety of patch size. This ERU also includes small areas of cedar habitat types and historic occurrence of western white pine. Western white pine restoration is appropriate in VRU 17. About 20,000 acres of VRU 7 and 10 potentially suitable for conserving existing vegetation pattern occur in this ERU. About 1,000 acres of VRU 1 potentially suitable for whitebark pine restoration occur in this ERU.

Wildlife

Themes- Produce early seral habitat (Very High Priority), Conserve late seral habitat (Moderate Priority), Enhance wildlife security (Moderate Priority).

Background and Findings - American River has high potential for both black-backed woodpeckers and lynx. Several late seral species likely use American River ERU, including American marten, fisher, pileated woodpecker, and Northern goshawk.

Treatment Objectives - Produce early seral habitat: the purpose of this theme is to benefit black-backed woodpecker (Very High Priority, VRUs 1, 3, 6, 7, 8, 10), and lynx (Moderate Priority, VRUs 1, 6, 7, 9, 10). To improve habitat conditions for black-backed woodpecker, lethal severity prescribed burns should be applied in lodgepole pine forest. Applications might include partial harvest of mid or late seral forest, followed by burning. The purpose should be to create areas of high snag density, with snag retention for at least 5 years post-fire. A high priority was assigned to this treatment because there is little or no post-fire habitat currently available within the American River ERU. Habitat management for lynx should focus on creating forest openings by fire or timber harvest. Openings should be at least 25 acres in size, with the goal being to create dense stands of deciduous brush and young conifers, attractive to snowshoe hare. Optimally, 30% of the suitable VRUs would be in early seral condition, with preference given to young lodgepole pine and subalpine fir/Engelmann spruce forest types. Currently, this recommendation is being exceeded, and thus the Moderate Priority rating (as opposed to High or Very High Priority).

Conserve late seral habitat: Recommendations for this theme in American River ERU are complicated by the number of species involved. For example, American marten prefer high-elevation late seral forest, such as subalpine fir and Engelmann spruce. Fisher and Northern goshawk however, are more typically found in lower elevation forests dominated by mixed conifers. The recommended amount of late seral forest also varies, from at least 5% for Northern goshawk to 45% for fisher and American marten. The best overall strategy would be manage for the amount of late seral habitat that represents the upper end of the natural range of variation. In American River ERU, this equates to 25% late seral habitat. This habitat should encompass all forest types, with preference given to large (greater than 100 acre) blocks. Currently, 51% of the ERU supports late seral habitat.

Enhance Wildlife Security (VRUs 1,2,3,4,7,9,10): This theme is aimed at benefiting furbearers such as lynx and American marten. At present, only 10% of the drainage has sufficient furbearer security due to high open road densities. The current perceived impact of trapping however, is slight. Site specific proposals to increase wildlife security should be examined whenever road or trail changes are proposed.

Recreation

Themes - Lower: Provide roaded recreation (Moderate Priority). Upper: Provide trail recreation (Very High Priority).

Background and Findings - The predominant recreational uses are hunting, fishing, wood cutting, ORV riding, and snowmobiling. Motorized and non motorized trail uses by local and out-of-area recreationists are increasing due primarily to the popularity of the Anderson Butte National Recreation Trail in Upper American River. Proposed vegetation treatments, and aquatic and wildlife themes are compatible with the roaded and trail recreation themes.

Treatment Objectives - Motorized trail uses are recommended given the desirability of providing as great a variety of opportunities as possible to a community becoming more dependent on recreation and tourism. Additional planning is needed for dispersed campsites, trailheads, parking, trail maintenance and interpretation of historical features. A trail management plan is needed for the Anderson Butte trail and connectors which consider trailhead access and trail facility needs from Limber Luke to Red River Hot Springs. Such plans should consider opportunities to interpret the history of the Nez Perce people, the Elk City Wagon Road and past mining.

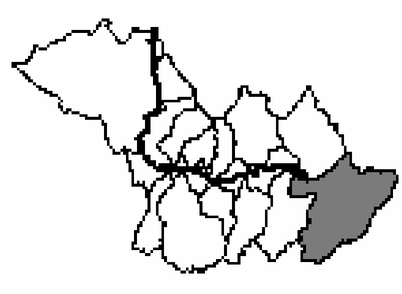
Roads

Themes - Lower: Reduce adverse effects with an emphasis on reducing overall densities. Upper: Maintain a core road system and reduce adverse effects throughout.

Background and Findings - Existing road density throughout the American River drainage is approximately 2.3 miles per section of land. This includes roadways from all ownerships including private, County, Bureau of Land Management, and Forest Service. As might be expected, these miles are not evenly distributed due to differing management objectives of the varying ownerships. However, even on the Forest Service managed lands, the roads are not evenly distributed.

Treatment Objectives - The collector, arterial, and main local road access should be maintained in the Upper American River in support of vegetative management, recreation, and community needs. Road segments under Forest Service jurisdiction should be selectively obliterated over time in the lower ERU to lessen effects on the aquatic environment; primarily focusing on reductions in sedimentation. Some repatterning of road systems involving combinations of reroutes and relocations as well as obliteration could improve the overall efficiency of the road network. Collaboration with the other ownerships and road management entities is encouraged. An evaluation and road management plan for the Erickson Ridge road is recommended. Overall reductions in densities of up to 20% may be achievable over time.

Red River Ecological Reporting Unit



Area Themes - Lower and Middle Red River: Restore aquatic processes. Upper Red River: Restore aquatic processes and Restore whitebark pine.

Location and Size - Red River ERU encompasses an area approximately 103,000 acres in size. The ERU extends from the confluence of the South Fork Clearwater River below Elk City to an area near Dixie. See Map 7.

Aquatic

***Theme* -** Restore Aquatic Processes (Very High Priority)

***Background* -** Red River is a very large (103,348 acres) and important watershed, that has had the largest alteration of historic sediment regimes in the subbasin. The lower subdivision of Red River is composed mostly of ALTA 6, mid to upper elevation low relief hills, with important areas of ALTA 18, mid to upper elevation alluvial valleys. The mid subdivision is mostly ALTA 4, low relief hills generally associated with lower elevations, along with some ALTA 18. Upper Red River is composed of ALTA 1, high elevation broad ridges (Map 6). Red River is predominantly hydrologic zone 2, mid elevation rolling uplands, with the upper subdivision being zone 1, high elevation mountains.

The streams in this watershed have a high frequency of B and C channel types, and a branched channel pattern, that combine to create a high aquatic potential. Red River is rated as very high potential for spring chinook, bull trout, and westslope cutthroat (Map 33a, 34a, 36a). It is rated as having a high potential for steelhead (Map 35a).

Red River has had a large amount of management activity. The watershed has been affected by historic mining (although somewhat less so than the other watersheds in the upper basin), a moderate level of roads that encroach on stream/riparian process, and grazing effects along the mainstem (Map 15). There have been about 23,000 acres of timber harvest in Red River (22% of the area and 37% of the harvest in the subbasin). About 5,000 acres of this harvest has been in the RHCA (about 1/3 of the RHCA harvest in the subbasin) (Map 12). There are about 588 miles of existing road in the watershed (3.6 mi/sq mi); about 175 miles in the RHCA (about 25% of the RHCA roads in the subbasin) (Map 13, 14). There are very few large areas of low development, however, where they do exist, most are in the upper subdivision (Map 21). The current ECA for the watershed is 12% and the current sediment yield is 24% over natural base (the highest in the subbasin). The overall condition rating for Red River is low, with a portion of the upper subdivision being rated moderate (Map 30). The Forest Plan fish/water quality objective established for Red River is predominantly 90% (Map 31). The current condition is considered well below this objective (Map 32). There are a large number of streams in Red River that are designated as water quality limited by the State of Idaho (Map 29).

***Findings* -** The aquatic conditions and watershed processes in Red River appear to have the highest degree of alteration of the sediment regime in the subbasin. The current sediment yield is the highest percent over base for the subbasin, with the stream channels in Red River having a low resistance to these effects. The historic regime for this watershed is infrequent pulse disturbance events, followed by long periods of relative stable conditions (Figure 3.4). As a result of management (primarily timber harvest and road construction) over the past several decades, this watershed has been subjected to one of the highest frequencies of disturbance in the subbasin. This disturbance has been evenly spread throughout the watershed. The current disturbance regime respresents a marked departure from the historic situation.

The aquatic condition and the population dynamics of aquatic species have been influenced by this change in disturbance regimes. There has been a reduction in habitat condition based on both the change in disturbance frequency, and the streams' sensitivity to this change. The watershed has changed from a condition with patches of active disturbance/recovery, surrounded by areas of stable, high quality habitat, to a condition of homogeneously degraded habitat. The ability of aquatic species to persist has been reduced, and the ability to rebuild or refound areas from local stronger populations has also been reduced.

Red River has spring chinook, steelhead, bull trout, and westslope cutthroat present in the watershed, with wide distribution. While generally found in low numbers, there are pockets of higher densities. Pacific lamprey are found migrating into Red River in relatively high numbers. Brook trout, and small numbers of hatchery rainbow, are present and widely distributed through the watershed, with some areas of high density (Map 37). Red River is considered a historic stronghold for all four fish species at risk assessed (Maps 33b, 34b, 35b, 36b).

Recommendations/Treatment Objectives **-** The recommended aquatic theme for Red River is restoration of aquatic processes, with a very high priority (Map 48). The unique aquatic potential of this watershed makes it an important watershed to restore. Even given the high level of historic management activity, and the presence of brook trout, this watershed still supports aquatic species at relatively high levels. This is probably due to both restoration efforts that have been accomplished in the watershed, and the watershed's inherent high capability. With the very high capability of this watershed, even at a reduced condition, this watershed can play a vital role in aquatic species conservation in the subbasin.

Restoration of this watershed is necessary to stabilize existing populations, along with providing the best opportunity for a longterm population source area in the future. The sediment regime should be the primary focus of aquatic restoration. To accomplish this, there would need to be a decrease in the amount and effects of the existing roads, particularly streamside roads. Additionally, riparian and instream process needs to be restored in some areas, primarily in the meadow sections. The first step in this restoration effort should be a detailed EAWS specifically addressing: 1) the existing road system, and 2) the development of a transportation plan that considers aquatic, vegetative, recreational, and other important considerations. Completion of the EAWS for Red River is a high priority from an aquatics perspective.

The aquatic restoration in this watershed needs to proceed as quickly as possible. The restoration of this watershed would not be quick or easy. It would take a sustained effort over many years to restore the aquatic function of Red River. The disturbance in this watershed is widespread, the stream channels do not have high resilience, there are many large blocks with high development, and there are complexities associated with multiple land ownership. However, aquatic restoration of this watershed needs to occur. This watershed contains a disproportionately high amount of the aquatic potential in the subbasin.

The recommended change in vegetative treatment pattern and frequency, along with the need for aquatic restoration, suggest a shift to a more ephemeral road system. This conversion in the type of road system is essential to achieving the recommended aquatic restoration. In the upper subdivision there are fewer roads. The road theme is to maintain the existing system. However, even with this general theme, there are areas of high road density in the upper subdivision, and with the recommended conversion to an ephemeral type system, there should be some additional reduction in the amount of road.

Red River is an important recreational area, and recreational access in this watershed is important. The discussion above regarding the reduction in roads in this watershed is not as much in conflict with this recreational theme as it might appear. A large percentage of the roads in Red River are currently restricted in some manner (Map 27). Maintaining and even improving recreational access, while still reducing the amount of total road, is possible. The most likely consequence of these recommendations would be that there were specific sites where access might not be continuously available, if they were in a large block where roads had been removed following treatment.

Vegetation

Themes **-** Lower: Restore vegetation pattern (Moderate Priority). Middle: Restore ponderosa pine (Moderate Priority). Upper: Restore whitebark pine (Very High Priority) and Restore vegetation pattern (Moderate Priority).

Lower Red River Background and Findings **-** Much of Red River has gentle to moderate slopes subject to infrequent stand replacing and mixed fire (VRUs 1 and 6). Lodgepole pine and western larch were more important than ponderosa pine. In these areas, harvest entries have been extensive, dispersed, mostly clearcut, and more frequent than historical fire disturbance. Diversity of patch size, and abundance of snag patches have been lost. Extensive grazing and development have occurred in the main meadows.

Lower Red River Treatment Objectives - Disturbance activities can occur in a subwatershed no more than once in about 35 years to help recover watershed function and treatments scaled more in harmony with historic process. Working to reconfigure disturbance patterns (often within existing sale areas), produce more early seral stages, provide snag patches, and greater variety of patch size while retaining some overstory western larch, Douglas-fir, and grand fir comprise the theme in these upland areas. About 91,000 acres of VRUs 1 and 6 potentially suitable for the repatterning vegetation theme occur in this ERU

Middle Red River Background and Findings - On warm sites near the main meadows, plant communities were historically shaped by low and mixed severity fire, and featured ponderosa pine and Douglas-fir, with some grand fir, western larch, and lodgepole pine. Fire suppression, forest succession, and extensive timber harvest have resulted in declines in open pine stands, and increases in grand fir and Douglas-fir. Restoring ponderosa pine is appropriate in this area.

Middle Red River Treatment Objectives - Disturbance activity in subwatersheds as often as every 10 to 30 years may be appropriate in this VRU. About 7,700 acres of VRU 4 potentially is suitable for ponderosa pine restoration.

Upper Red River Background and Findings - Higher elevation uplands in Red River included a minor whitebark pine component. Repatterning of vegetation can be done while restoring some whitebark pine presence in these areas.

Upper Red River Treatment Objectives - About 31,000 acres of VRU 1 potentially suitable for whitebark pine restoration occur in this ERU,

Wildlife

Themes - Produce early seral habitat (Very High Priority), Conserve late seral habitat (Moderate Priority), and Enhance wildlife security (Moderate Priority).

Background and Findings - The Red River ERU supports a diverse wildlife community. It is especially important as potential habitat for black-backed woodpeckers and lynx, as this ERU contains the most extensive lodgepole pine forest in the entire South Fork subbasin. In Lower Red River, elk winter in sizeable numbers. Late seral species known to be present include American marten, Northern goshawk, boreal owl, and fisher. Flammulated owls may also occur in the Red River ERU, even though the extent of their preferred habitat (open-grown ponderosa pine forest) is very limited, encompassing only 185 acres. The restricted amount of this habitat would likely preclude occupation by flammulated owls except that extensive, occupied ponderosa pine habitat is available in the nearby Salmon River subbasin. If flammulated owls are found in Red River ERU by future surveys, a Restore ponderosa pine theme (High Priority) would also be appropriate.

Treatment Objectives - Produce early seral habitat: strategies to benefit black-backed woodpeckers (Very High Priority) entail reintroducing lethal severity prescribed burns to lodgepole pine forest. Applications might include partial harvest of mid or late seral forest, followed by burning. The purpose should be to create areas of high snag density, with snag retention for at least 5 years post-fire. These strategies could also improve lynx habitat (Moderate Priority), if activities were carried out above the 4500 foot elevation level in the VRUs the two species share (1, 4, 5, 6, 7, 10). Red River ERU is the only ERU with significant lynx habitat potential that currently has less than 30% early seral habitat, although the short fall is minor (24% vs. 30%). Winter elk habitat (High Priority) would be improved by using fire or timber harvest to increase available winter forage from the existing 27% Early Seral Habitat to 40%.

Conserve late seral habitat (primarily VRUs 1, 3, 4, 6, 7, 9 and 10): Based on photo interpretation, the Red River ERU has the lowest percentage (19%) of late seral habitat of any ERU. Part of this is due to the difficulty of correctly differentiating mid seral lodgepole pine forest from late seral lodgepole pine forest, as both seres have small diameter trees. Maintaining Red River ERU at the upper end of its natural range of variation for late seral forest (approximately 22%) would ensure high-quality habitat for fisher and American marten. Boreal owls (High Priority, VRUs 1, 4, 6, 7, 9 and 10) would also benefit from such management.

Enhance wildlife security (all VRUs): This theme is focused on improving the availability of wildlife security for elk during the non-winter period. Three of seventeen Elk Habitat Units within this ERU are more than 5 points below their objective. Site specific proposals to increase wildlife security should be examined whenever road or trail changes are proposed.

Recreation

Themes - Lower: Provide roaded and trail recreation (Very High Priority). Middle: Conserve scenic integrity (High Priority). Upper: Provide roaded and trail recreation (Moderate Priority).

Background and Findings - The Red River meadow complexes and gentle rolling mountains dominate the sense of place of this drainage. Despite extensive logging, there is still a sense of remoteness and primitiveness. The area is known for campgrounds, trails, snowmobiling, and scenic attractiveness. All terrain vehicle use (especially 4-wheelers) is increasing and causing trail damage in some areas.

Treatment Objectives - The motorized trail access from the Red River Hot Springs resort to Blackhawk Mountain and the Anderson Butte National Recreation trail should be retained. Not all trails need be motorized as unrestricted access might conflict with elk security and developed campground objectives. A trail access plan is needed for this watershed. Achievement of high visual objectives is the overriding social concern, and this could depend as much on private land development within the meadows as on pine restoration treatments in the uplands. Additional planning is needed for campgrounds, dispersed sites, trailheads, parking, trail maintenance (including snow trails) and interpretation of historical features. A seasonally restricted trail along the upper Red River and Crooked River drainages from French Gulch across Porters Mountain, Moose Butte to Dixie Summit and connecting with Jack Mountain, Soda Creek Point, and Black Hawk should be considered for a backcountry motorcycle loop. The Southern Nez Perce Trail should be protected and interpreted where adjacent to the Montana road.

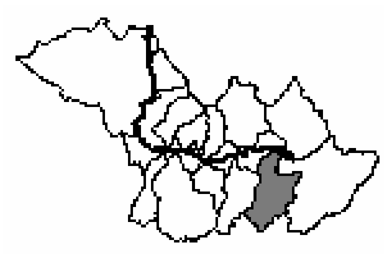
Roads

Themes - Lower and Middle: Reduce adverse effects with an emphasis on reducing overall road density. Upper: Maintain a core road system and reduce adverse effects throughout.

Background and Findings - Much of the drainage has a history of intensive management activities. County road systems at or near the valley bottoms along the mainstem and the South Fork Red River provide the primary access, including access to the community of Dixie. Existing road density for the area is approximately 3.6 miles per square mile of land. Many of the roads on the National Forest are impassable due to vegetation. In addition, approximately 80% of all miles existing in the drainage are restricted in some fashion in terms of season of use or vehicle type (See Map 27).

Treatment Objectives - Reducing road densities reduces sedimentation and subsequent impacts to the aquatic environment. Vegetative treatment concepts coupled with the road density reduction theme are fully compatible by virtue of the ephemeral road concept. Reducing road densities and reassessing access restrictions may well allow for improved recreation access, as well as improved wildlife habitat security. Continuing efforts to work collaboratively with Idaho County in the management of the Red River roads should be pursued. Overall reductions in existing road densities of up to 35% may be achievable over time.

Crooked River Ecological Reporting Unit



Area Themes - Lower Crooked River: Restore Aquatic Processes. Upper Crooked River: Conserve existing aquatic function and Restore whitebark pine.

Location and Size - Crooked River ERU encompasses an area approximately 45,000 acres in size. The ERU extends south from the South Fork Clearwater River to an area near Orogrande Summit. See Map 7.

Aquatic

***Themes* -** Lower Crooked River: Restore Aquatic Processes (Very High Priority). Upper Crooked River: Conserve Existing Aquatic Function (Very High Priority)

***Background* -** Crooked River is a large watershed (45,659 acres) with important aquatic values. The mainstem river is contained principally in a narrow alluvial valley (ALTA 18), within a breaklands setting (ALTA 3) in the lower end, and mountain uplands in the upper portion (ALTA 21). The upper watershed is ringed by high elevation areas (ALTA's 1 and 2) (Map 6). This watershed is in hydrologic zone 2 in the lower portion, and zone 1 in the upper watershed.

Crooked River has a very high habitat potential for spring chinook and steelhead in the lower portion, and a very high potential for bull trout and westslope cutthroat in the upper watershed, with the mainstem channel being subadult/adult rearing habitat of very high potential for these two species (Maps 33a, 34a, 35a, 36a).

Crooked River has been significantly affected by human activity, primarily in the lower section. The predominant feature is the historic dredge mining along the mainstem river, which has altered stream and riparian processes (Map 15). The mainstem of Crooked River is further affected by a streamside road for most of its length. This streamside road encroaches on riparian and stream process for about half its length (Map 15). There hve been about 4,600 acres of timber harvest in the watershed (10% of the area), primarily in the lower watershed. About 700 acres of this harvest have been in the RHCA (Map 12). There are 137 miles of existing road in the Crooked River (2.0 mi/sq mi). About 40 miles of this is in the RHCA (Maps 13 and 14). The upper half of the watershed is mostly unroaded. The current ECA for this watershed is 6%, and the current sediment yield is 8% over natural base. The overall condition for this watershed is considered low, although this is mostly in the lower watershed. Crooked River has a Forest Plan fish/water quality objective of 90%. The entire stream is considered well below this objective, however, this rating is much better represented in the lower watershed. Lower Crooked River and Relief Creek have been designated water quality limited streams by the State of Idaho.

***Findings* -** The primary departure from historic disturbance regimes in Crooked River is associated with the riparian and instream processes of the mainstem channel. The upper watershed appears to have disturbance regimes consistent with historic process. The upland portion of the lower watershed and small parts of the upper watershed have altered conditions and processes due primarily to the road system.

The aquatic habitat condition in the upper watershed is good. This area supports strong populations of westslope, and bull trout at some of the highest densities in the subbasin. While the habitat condition of the mainstem is low, it continues to support both steelhead and spring chinook. Brook trout are present in this watershed, principally above a passage barrier on the west fork, and in the lower mainstem. Brook trout in the West Fork, believed to be emigrating from past stocking in Rainbow Lake, pose a risk to downstream bull trout and westslope. This issue needs to be addressed. The densities above the barrier are very high, while only one brook trout was found below the barrier. Crooked River is considered a stronghold for westslope cutthroat, a habitat stronghold for bull trout, and a historic stronghold for spring chinook and steelhead (Maps 33b, 34b, 35b, 36b).

***Recommendations/Treatment Objectives* -** The aquatic theme for lower Crooked is restoration of aquatic processes, with a very high priority rating (Map 48). This restoration needs to focus on the stream/riparian processes and the sediment regime.

Restoration in the lower watershed should focus primarily on restoring, to the extent possible, the hydrologic and riparian processes of the mainstem channel, with aquatic habitat creation being the end result. Past restoration efforts in this channel were successful where they re-established hydrologic function, and largely unsuccessful (with the exception of providing cover) in areas where hydrologic function was not re-established. Treatment objectives include increased pool volume and pool depth, increased role of woody debris in the channel, increased complexity and diversity of habitat types. This restoration will provide increased habitat potential for steelhead and spring chinook, along with subadult/adult rearing habitat for bull trout and westslope cutthroat in the upper basin. Restoration of this channel will greatly improve the connectivity to the rest of the subbasin of the existing good habitat and populations in the upper watershed.

Restoration of this mainstem channel will not be easy or inexpensive. Preparing for this restoration will require detailed analysis and good planning. It will likely need to be phased in over time, due to the cost. However, the potential benefits to aquatic species, particularly species at risk which occupy this watershed, would be great. Loss of the aquatic habitat potential of these tributary mainstems is the most significant changed condition within the subbasin for aquatic species. Without active restoration, it will take a very long time to recover the steam/riparian processes naturally in the mainstem channel.

Secondarily, this restoration needs to address the effects of the existing road system in the remainder of lower Crooked River. There are site-specific road related needs for restoration in the upper watershed as well that should be addressed. The vegetative priority for the lower watershed is to re-establish the historic frequency of disturbance. This and the aquatic restoration needs have resulted in the recommendation to transition to an ephemeral road system in this area. This analysis of the existing road system should be through an EAWS. The priority for this watershed for completing a EAWS is high from an aquatic perspective, in order to facilitate the implementation of the recommended aquatic theme.

The brook trout in this watershed, particularly in the upper west fork, need to be a focus of joint IDF&G and USFS restoration efforts in this watershed. This appears to be a watershed where the threat of brook trout can be minimized if action is taken quickly. In additon, the restoration of hydrological function and habitat conditions in the mainstem river will benefit both aquatic species and people fishing in this area. An evaluation, by IDF&G, of fishing pressure and its effect on the rebuilding of the migratory population of westslope and bull trout in this watershed needs to be considered as physical restoration efforts proceed.

The restoration of aquatic processes in this watershed can be achieved fairly rapidly, if the work necessary to bring about this restoration is accomplished. The impacts in this watershed are not evenly distributed. Large portions of the watershed have not been impacted significantly, primarily the upper watershed. The stream channels in this watershed are fairly resilient and will respond quickly, including the mainstem channel. It is still possible to manage the threat of brook trout, particularly in the upper watershed. Important aquatic species are present, and densities of bull trout and cutthroat in the upper watershed are relatively high, to serve as source populations for rebuilding the restored habitats downstream.

The recommended area theme for this watershed is aquatic restoration in the lower watershed, and conservation of existing aquatic conditions in the upper watershed, along with the restoration of whitebark pine (Map 53). These two themes can be compatible in this upper watershed if the vegetative theme can be accomplished without the construction of significant amounts of road. The recommended road theme for this upper watershed is to defer new roads. The recommended recreation theme for this watershed recognizes the importance of this area for roaded recreational use, including camping and fishing. Further development of this watershed for recreational use can be made compatible with the aquatic themes, and offers a unique potential for integration of these two themes. There has been considerable homesite development, mostly along the mainstem river, in this watershed. Restoration efforts in this watershed should proceed as a public/private partnership with these individuals. Restoration of a productive river should be a common goal everyone can support.

Vegetation

Themes - Lower: Restore vegetation pattern (Moderate Priority). Upper: Restore whitebark pine (Very High Priority) and Restore vegetation pattern (Moderate Priority).

Lower Crooked River Background and Findings - Much of Crooked River has gentle to moderate slopes subject to infrequent stand replacing and mixed fire (VRUs 1 and 6). Lodgepole pine and western larch were more dominant than ponderosa pine. In lower Crooked River, harvest entries have been extensive, dispersed, mostly clearcut, and more frequent than historical fire disturbance. Diversity of patch size, and abundance of snag patches have been lost. Extensive mining has changed the historic meadow system to dredge spoils.

Lower Crooked River Treatment Objectives - Disturbance activities can occur in a subwatershed no more than once in about 35 years to help recover watershed function and treatments scaled more in harmony with historic process. Working, often within existing sale areas, to reconfigure disturbance patterns, produce more early seral stages, provide snag patches, and greater variety of patch size while retaining some overstory western larch, Douglas-fir, and grand fir comprise the theme in these upland areas. About 32,000 acres of VRUs 1 and 6 potentially suitable for the restore vegetation pattern theme occur in this ERU. About 6,300 acres of VRU 3 occur in this ERU, where ponderosa pine restoration could be suitable, and about 3,800 acres of VRU 7 occur, where conserving existing vegetation patterns could be suitable.

Upper Crooked River Background and Findings - Higher elevation uplands in Crooked River (VRUs 1 and 2) included a minor whitebark pine component.

Upper Crooked River Treatment Objectives - Repatterning of vegetation can be done while restoring some whitebark pine presence in these areas. Natural or management-ignited prescribed fire would be suitable where harvest is inappropriate. About 23,000 acres of VRUs 1 and 2 potentially suitable for whitebark pine restoration occur in this ERU.

Wildlife

Themes - Produce early seral habitat (High Priority), Conserve late seral habitat (Low Priority).

Background and Findings - In terms of wildlife habitat, Crooked River ERU is similar to American River ERU in several ways. Both ERUs provide important existing or potential habitat for lynx, boreal owl, Northern goshawk, fisher, American marten, and black-backed woodpecker.

Treatment Objectives - Produce early seral habitat: the purpose of this theme is to benefit black-backed woodpecker (High Priority, VRUs 1, 3, 6 and 7), and lynx (Low Priority, VRUs 1, 2, 6, 7, 9 and 10). Both species would benefit from post-fire or post-harvest and post-fire habitats in lodgepole pine, as long as extensive burned snags were retained, and dense stands of deciduous brush and sapling trees resulted. Currently, Crooked River ERU contains no post-fire snag habitat, but does contain 30% early seral habitat in the VRUs suitable to lynx, which matches habitat recommendations.

Conserve late seral habitat (VRUs 1, 3, 4, 6, 7, 9 and 10): This theme is aimed at benefiting American marten, boreal owl, fisher, and Northern goshawk, all of which have varying requirements regarding the type and amount of preferred late seral habitat. The best overall strategy would be to maintain the distribution of all forest types at the upper end of their natural range of variation for late seral forest. Overall, this equates to 22% late seral habitat. Currently, 47% of the ERU provides such habitat.

Recreation

Theme - Lower and Upper: Provide roaded recreation (Moderate Priority).

Background and Findings - Recreation use is low to moderate with most occurring during the summer and early fall. The highly altered stream channel from dredge mining dominates the view of Crooked River travellers. The main road is a popular travelway for motorists on the "Gold Rush Loop Auto Tour" from Crooked River to Elk City via Penman Hill and Dixie and is groomed for winter snowmobile use. The Orogrande Summit road provides motorized access to the Gospel Hump Wilderness.

Treatment Objectives - Additional dispersed camping and interpretive sites are needed along the Crooked River Road to Orogrande Townsite and across Penman Hill to Dixie. Mining history and stream rehabilitation should be interpreted for forest visitors. The road above Orogrande to Orogrande Summit should be reconstructed and surfaced to provide safe vehicle access and conserve hydrologic function and snowmobile trail grooming accommodated. An access management plan recognizing wilderness issues and access is needed. The Divide Trail between Crooked and Red Rivers across Porters and Moose Butte should be considered as part of an upper Red River, seasonally restricted, motorcycle loop.

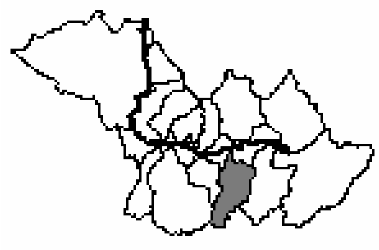
Roads

Themes - Lower: Maintain a core road system and reduce adverse effects throughout. Upper: Defer new roads.

Background and Findings - Roads have been developed in the Crooked River drainage for mining and vegetative treatment purposes. Some of these roads currently serve as important recreation corridors. Existing road density is approximately 2.0 miles per square mile of land, though it is not evenly distributed with most of the miles occurring in the lower ERU. The Crooked River road is under the jurisdiction of Idaho County up to the community of Orogrande.

Treatment Objectives - The road systems should be managed and maintained to reduce sedimentation. The Forest should continue to work collaboratively with Idaho County on the Crooked river road to reduce sediment and riparian impacts.

Tenmile Creek Ecological Reporting Unit



Area Theme - Lower and Upper Tenmile: Conserve existing aquatic function

Location and Size - Tenmile Creek ERU encompasses an area approximately 35,000 acres in size. The ERU extends south from the mainstem South Fork Clearwater River to an area near Buffalo Hump. See Map 7.

Aquatic

***Theme* -** Conserve Existing Aquatic Function (Very High Priority)

***Background* -** Tenmile Creek is a moderate sized watershed (34,410 acres), with very high aquatic potential and existing condition. The Tenmile watershed is composed of a mixture of ALTAs 3, 6, and 21 in the lower half, and a high elevation complex of ALTAs 1, 2, and 5 in the upper portion (Map 6). The hydrologic regime is composed of high elevation zone 1 in the upper watershed, and a mixture of zone 2 and 3 in the lower watershed.

Tenmile Creek is rated as having very high potential for steelhead, bull trout, and westslope cutthroat, and a high potential rating for spring chinook, due to the slightly higher gradient of the mainstem (Maps 33a, 34a, 35a, 36a).

Tenmile Creek has had a very limited management history. There has been about 340 acres of harvest in the watershed (1% of the area), with about 1/3 of this in the RHCA (Map 12). There are about 25 miles of existing road in the watershed (0.4 mi/sq mi), about 1/3 of this is in the RHCA (Map 13 and 14). Most of this watershed has had a low level of development (Map 21). The current ECA is 1%, and current sediment yield is 1% over natural base. The overall condition of this watershed is high (Map 30). The Forest Plan fish/water quality objective for Tenmile Creek is 90% for the areas outside Wilderness (Map 31), and is considered to be currently above this objective (Map 32).

***Findings* -** There has been little to no departure from historic aquatic disturbance regimes in Tenmile Creek. The watershed is currently occupied by steelhead, bull trout, westslope cutthroat, and possibly spring chinook. Brook trout have been documented in the lower mainstem (Map 37), however, this is believed to be incidental use. Tenmile Creek is considered a current stronghold for steelhead, westslope cutthroat, and bull trout, and a habitat stronghold for spring chinook (Maps 33b, 34b, 35b, 36b).

***Recommendations/Treatment Objectives* -** The recommended aquatic theme for this area is to conserve existing aquatic function, with a very high priority (Map 48). Tenmile Creek is an extremely important watershed for aquatic species, serving both as an important part of the foundation of existing species viability and as a future source area for the rebuilding of restored habitats in the subbasin. This aquatic theme is the recommended area theme for this watershed, along with the restoration of whitebark pine in the upper watershed. Active management would probably not be required to conserve this aquatic function. Other management activities in this watershed that pose any risk to this condition should be deferred until other important aquatic habitats in the upper subbasin have been restored.

Vegetation

***Themes* -** Lower: Restore vegetation pattern (Moderate Priority). Upper: Restore whitebark pine (Very High Priority).

Lower Tenmile Creek Background and Findings - Much of Tenmile Creek has moderate slopes subject to infrequent stand replacing and mixed fire (VRUs 1 and 6). Lodgepole pine and western larch were more important than ponderosa pine. In these areas, timber harvest has been minimal, but forest succession and fire suppression have resulted in loss of early seral stages, increases in medium and large tree stages, and increases of spruce-fir forest. Diversity of patch size, and abundance of snag patches have been lost.

Lower Tenmile Creek Treatment Objectives - Disturbance activities can occur in a subwatershed no more than once in about 35 years to help recover watershed function and treatments scaled more in harmony with historic process. Working to reintroduce moderate to large disturbance patterns, produce more early seral stages, and provide snag patches, while retaining some overstory western larch, Douglas-fir, and grand fir comprise the theme in these upland areas. Lower canyons (VRU 3) are suitable for the restoring ponderosa pine theme. About 18,600 acres of VRUs 1 and 6 potentially suitable for the repatterning vegetation theme occur in this ERU. About 5,700 acres of VRU 3 occur, where ponderosa pine restoration could be suitable.

Upper Tenmile Creek Background and Findings - Higher elevation uplands in Tenmile Creek once included a minor to important whitebark pine component (VRUs 1, 2 and 9).

Upper Tenmile Creek Treatment Objectives - Repatterning of vegetation can be done while restoring whitebark pine presence in these areas. Much of this upper elevation area is wilderness, and prescribed natural or management-ignited fire can be instrumental in whitebark restoration. About 21,800 acres of VRUs 1, 2 and 9 potentially suitable for whitebark pine restoration occur in this ERU.

Wildlife

Themes - Produce early seral habitat (Moderate Priority), Conserve late seral habitat (Moderate Priority).

Background and Findings - Tenmile ERU contains expansive stands of lodgepole pine. As such, it has some of the highest potential for black-backed woodpecker habitat within the South Fork subbasin. Most of this forest however, is still too young to provide suitable habitat. Current habitat conditions are considered of high quality for American marten, and fisher, although this too will improve as the forest ages. The most unique feature of this ERU, is the extensive unroad area, providing high-quality habitat for disturbance sensitive wildlife. Much of this unroad area is contained within the Gospel-Hump Wilderness.

Treatment Objectives - Produce early seral habitat (primarily VRUs 1, 3, 6 and 7): The purpose of this theme is to further benefit black-backed woodpeckers, by creating fire-killed snags and retaining them on the landscape for at least 5 years.

Conserve late seral habitat: Maintaining habitat quality for fisher and American marten should be considered whenever vegetation management is proposed within the Tenmile ERU. At least 18% of the ERU should be maintained in late seral habitat. Currently, 14% is in such habitat.

Recreation

Themes - Lower: Provide roaded recreation (Low Priority). Upper: Provide trail recreation (High Priority).

Background and Findings - The lower drainage is known for the primitive Sourdough-Santiam Road and the upper for dense lodgepole pine forests in the Gospel-Hump Wilderness. Big game hunting, trailhead access to Gospel-Hump Wilderness, and scenic drives to the historic Sourdough Lookout are important recreation activities.

Treatment Objectives - Dispersed campsites and trailhead improvements should be developed where needed. Wilderness trails should be maintained to prevent degradation and provide safe foot and horse travel. The semi-primitive character of the Santiam-Sourdough Road should be retained, while maintenance should be to a level to allow access for vehicles carrying stock.

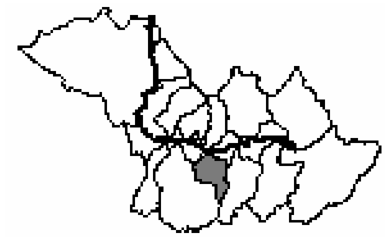
Roads

Themes - Lower: Defer new roads. Upper: Wilderness...roads not applicable.

Background and Findings - Much of Upper Tenmile drainage is within the Gospel-Hump Wilderness, therefore roads are not appropriate. The Tenmile drainage has approximately 0.4 miles of road per square mile of land. The Santiam-Sourdough road, a 1930s Civilian Conservation Corps constructed road , traverses the drainage in the lower ERU.

Treatment Objectives - The road theme is correlated strongly with the needs of the aquatic resources in this ERU. Existing roads, though not great in number, should be maintained with a focus on minimizing sedimentation effects. An analysis of mitigation and maintenance on the Santiam Sourdough road is recommended.

Wing-Twentymile Creek Ecological Reporting Unit



Area Themes - Lower Twentymile: Conserve existing aquatic function and Restore vegetation pattern. Upper Twentymile: Restore whitebark pine. Wing Creek: Conserve existing aquatic function and Conserve existing vegetation conditions.

Location and Size - Wing-Twentymile Creek ERU encompasses Wing Creek and Twentymile Creek watersheds, an area approximately 20,000 acres in size. The ERU extends from south of the mainstem South Fork Clearwater River to an area near Twentymile Butte. See Map 7.

Aquatic

***Themes* -** Lower East and Upper Wing/Twenty - Conserve Existing Aquatic Function (High Priority). Lower West Wing Twenty - Conserve Existing Aquatic Function (Moderate Priority)

***Background* -** Wing and Twentymile are moderate sized watersheds (19,651 acres), naturally barriered to fish, that have isolated populations of westslope cutthroat. Wing Creek is composed of ALTAs 3, 6, and 21. Twentymile Creek has a small portion of ALTA 3 near the mouth, the central part of the watershed is ALTA 6, and the upper watershed is comprised of ALTA 21 and ALTA 1 in the headwaters (Map 6). The hydrologic regime in these watersheds is characterized by bands of zone 3, zone 2, and zone 1 corresponding to the elevation.

These watersheds are naturally barriered to spring chinook, steelhead, and bull trout, except for short sections near the mouth (270 meters). Twentymile Creek is considered to have a high potential for westslope cutthroat, while Wing Creek is rated as moderate habitat potential for cutthroat (Map 33a).

These watersheds have had limited management activity. Historic mining has not altered stream/riparian function (Map 15). There has been about 150 acres of timber harvest in the Twentymile Creek drainage and 57 acres in the Wing Creek drainage (1% of each area). There are 17 miles of existing road in the Twentymile Creek drainage (0.7 mi/sq mi) and 10 miles in the Wing Creek drainage (1.2 mi/sq mi), including activities currently being implemented (Maps 13 and 14). Most of these two watersheds are areas of low development (Map 21). The current ECA for Twentymile is 1%, the current sediment yield is 4% over natural base. The current ECA for Wing Creek is 1%, the current sediment yield is 3% over natural base. The overall watershed condition for these two watersheds is considered high (Map 30). The Forest Plan fish/water quality objectives for these watersheds is 80% (Map 31). Wing Creek is considered to be at this objective condition, Twentymile is considered to be above this objective condition (Map 32).

***Findings* -** There has been little to no departure from historic aquatic disturbance regimes in the Wing/Twentymile watersheds. These watersheds are currently occupied by westslope cutthroat. Brook trout are not present in these watersheds. Twentymile Creek is considered a current stronghold for westslope cutthroat, and Wing Creek is considered an adjunct-secure area for westslope cutthroat (Map 33b). Both of these areas are considered a critical contributing, high quality area for spring chinook, steelhead and bull trout (Maps 34b, 35b, 36b).

***Recommendations/Treatment Objectives* -** The recommended aquatic theme for Twentymile (including the East Wing-Twenty and the Upper Wing-Twenty subdivisions) is conserve existing aquatic function, high priority (Map 48). The recommended aquatic theme for Wing Creek is conserve existing aquatic function, moderate priority. The high habitat potential and current strong population in Twentymile Creek make this an important isolated westslope cutthroat population. Both the habitat and the population in Wing Creek are of lessor importance. Existing aquatic function in these two watersheds should be conserved. The priority should influence and temper the management risks taken. The vegetative themes in these watersheds are not in conflict with this conservation emphasis. If additional roads are needed to accomplish other objectives, they should be located, constructed, and maintained to provide for implementation of the aquatic themes.

Vegetation

Themes **-** Lower Twentymile: Restore vegetation pattern (Moderate Priority). Upper Twentymile: Restore whitebark pine (Very High Priority). Wing: Conserve existing vegetation condition (Low Priority).

Wing and Lower Twentymile Creeks Background and Findings - Much of the Wing-Twentymile ERU has gentle to moderate slopes subject to infrequent stand replacing and mixed fire (VRUs 1 and 6). Lodgepole pine and western larch were more important than ponderosa pine. Timber harvest has been slight, but forest succession and fire suppression have resulted in loss of diversity of patch size, early seral stages, declines in lodgepole pine, and few snag patches. Uplands in western Wing Creek have more moisture (VRUs 7 and 10) than the lower portions of the drainage and were more subject to infrequent mixed fire. Grand fir, Douglas-fir, Engelmann spruce, and Pacific yew were more important than lodgepole pine. Harvest has been more extensive here but complex multi-age, old growth and abundance of snags and down wood have been otherwise retained.

Wing and Lower Twentymile CreeksTreatment Objectives - Disturbance activities can occur in a subwatershed no more than once in about 35 years to help recover watershed function and treatments scaled more in harmony with historic process in lower Twentymile and eastern Wing Creek. Treatments should include reintroducing moderate to large disturbance patterns, producing more early seral stages, and providing snag patches, while retaining some overstory western larch, Douglas-fir, and grand fir. In western Wing Creek, disturbance activities can occur in a subwatershed from 0 to 2 times in about 35 years to help recover watershed function and treatments scaled more in harmony with historic process. Treatment to maintain seral lodgepole pine and western larch on ridges, produce some early seral patches, maintain mostly complex stand structures, sustain old growth, provide snags in small patches or individuals, and provide greater variety of patch size comprise the theme in western Wing Creek. About 11,200 acres of VRUs 1 and 6 potentially suitable for the repatterning vegetation theme and about 5,000 acres of VRUs 7 and 10 potentially suitable for conserving existing vegetation pattern occur in this ERU. About 3,000 acres of VRU 3 occur, where ponderosa pine restoration could be suitable.

Upper Twentymile Creek Background and Findings - Higher elevation uplands in Twentymile Creek once included a minor whitebark pine component (VRU 1).

Upper Twentymile Creek Treatment Objectives - Repatterning of vegetation can be done while restoring whitebark pine presence in these areas. Much of this upper elevation area is wilderness, and prescribed natural or management-ignited fire can be instrumental in whitebark restoration.

Wildlife

Theme - Conserve late seral habitat (Low Priority).

Background and Findings - Wing Creek is characterized by extensive late seral habitat of the type preferred by Northern goshawk, and fisher. The remote character of much of this ERU also provides a valuable refugia for disturbance sensitive wildlife. The focus of the wildlife theme for this area is to maintain these characteristics.

Treatment Objectives - Conserve late seral habitat: Maintaining habitat quality for fisher and goshawk should be considered whenever vegetation management is proposed within Wing Creek ERU. Approximately 28% of such habitat should be retained. Current conditions (53% late seral habitat) exceed this recommendation.

Recreation

Themes - Lower Twentymile and Wing: Provide trail recreation (Low Priority). Upper Twentymile: Provide trail recreation (High Priority).

Background and Findings - Big game hunting from Sourdough Saddle is the most popular recreation activity. There is important trailhead access to Upper Wing Creek, Twentymile Meadows, and to Twentymile Lake in the Gospel-Hump Wilderness. Fishing, horse packing and hiking are becoming increasingly important and providing trail recreation here may become a higher priority for the subbasin. Sourdough Peak and the historical lookout and spectacular views into the Gospel Peaks are attracting more and more visitors.

Treatment Objectives - Dispersed campsites and trailhead improvements should be developed as needed. Motorized use of trails outside of wilderness should continue to be restricted. Wilderness and other trails should be maintained to prevent degradation and provide safe foot and horse travel. Roaded recreation opportunities should be provided while maintaining the semi-primitive character of the Santiam-Sourdough Road.

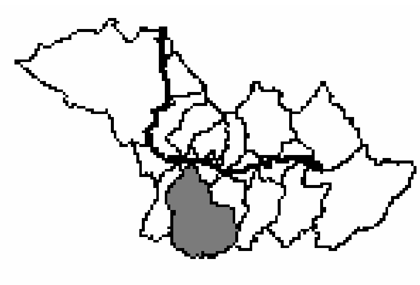
Roads

Themes - Lower Twentymile and Wing: Develop and maintain the road system. Focus on maintaining the existing road system. Upper Twentymile: Defer new roads.

Background and Findings - Existing densities in the Wing and Twentymile drainages are approximately 1.2 and 0.7 miles per square mile of land respectively.

Treatment Objectives - A limited amount of new local roads need to be developed to provide for vegetative treatment in the lower ERU. Additional road is not anticipated to be needed in the Upper ERU in the next 10-15 years.

Johns Creek Ecological Reporting Unit



Area Themes - Lower Johns: Conserve existing aquatic function and Restore ponderosa pine. West Johns: Restore Aquatic Processes and Restore ponderosa pine. Upper Johns: Conserve existing aquatic function and Restore whitebark pine.

Location and Size - Johns Creek ERU encompasses an area approximately 73,000 acres in size. The ERU extends south from the mainstem South Fork Clearwater River to an area near Square Mountain. See Map 7.

Aquatic

***Themes* -** Lower & Upper Johns: Conserve Existing Aquatic Function (Very High Priority). West Johns: Restore Aquatic Processes (High Priority)

***Background* -** Johns Creek is a large watershed (73,261 acres), with very high aquatic potential and existing condition. The lower portion of Johns Creek watershed is composed principally of ALTA 3, with some ALTA 4 and 21. The upper watershed is composed of the high elevation complex of ALTAs 1, 2, and 5. The western portion of Johns Creek, broken out because of the difference in its management history, is composed of ALTA 4 (Map 6). This watershed's hydrologic regime is composed of high elevation zone 1 in the upper watershed, and predominantly zone 3 in the lower watershed.

Johns Creek is rated as having very high potential for steelhead, bull trout, and westslope cutthroat, and a high potential rating for spring chinook, due to the slightly higher gradient of the mainstem channel (Maps 33a, 34a, 35a, 36a).

Johns Creek has had a very limited management history, with the exception of the western portion. There has been about 1,200 acres of harvest in the watershed (3% of the area), with about 1/3 of this in the RHCA (Map 12). There are about 60 miles of existing road in the watershed (0.5 mi/sq mi) (Map 13, 14). About 10 miles of this is in the RHCA. Most of this watershed remains in areas of low development (Map 21). The current ECA is <1%, and current sediment yield is 1% over natural base. The overall condition of this watershed is high, but the condition in the western portion is considered low (Map 30). The Forest Plan fish/water quality objective for lower Johns Creek is 90%, and 70% for western Johns (Map 31). The overall watershed is considered to be at this objective condition (Map 32).

***Findings* -** There has been little to no departure from historic aquatic disturbance regimes in most of Johns Creek. The western portion is an exception, where a moderate alteration has occurred. The watershed is currently occupied by steelhead, bull trout, westslope cutthroat, and spring chinook. Brook trout are not present in this watershed. Johns Creek is considered a current stronghold for steelhead, westslope cutthroat, and bull trout, and a habitat stronghold for spring chinook, due to the lower numbers of spring chinook present. West Johns is considered a population stronghold for westslope cutthroat, adjunct habitat for steelhead, and a degraded critical contributing area for bull trout and spring chinook (Maps 33b, 34b, 35b, 36b).

***Recommendations/Treatment Objectives* -** The recommended aquatic theme for upper and lower Johns Creek is to conserve existing aquatic function, with a very high priority (Map 48). Johns Creek is an extremely important watershed for aquatic species, serving both as an important part of the foundation of existing species viability and as a future source area for the rebuilding of restored habitats in the lower subbasin. The aquatic theme for West Johns is restore aquatic processes, high priority. This area has a very high potential for westslope cutthroat, and is a critical contributing area to the habitat in lower Johns. Restoration of this area would stabilize the habitat for the current strong population of westslope, while at the same time reducing the likelihood of adverse effects of this area on downstream areas.

This area themes for this watershed are a combination of the aquatic themes, described above, and the vegetative themes of restoring whitebark pine in the upper watershed and ponderosa pine in the lower watershed. The whitebark restoration theme in the upper watershed is entirely compatible with the aquatic theme in this area, given that most of this area is Wilderness and the vegetative theme would be primarily accomplished through prescribed natural fire. The two themes in West Johns can be made compatible, although the aquatic restoration would need to be accomplished without large reductions in road densities, based on the vegetative treatment frequency for this area (5 -25 years) and the gentle topography. Existing roads in the RHCA should be a focus of any restoration efforts. The aquatic and vegetative themes for lower Johns are potentially in conflict, due to the current lack of roads that could be used to accomplish the stand maintenance treatments suitable to the vegetative theme. The needs for vegetative treatment in this area are not as critical as the aquatic conservation needs. There are other areas where restoration of ponderosa pine is a higher priority. Consequently, the recommended road theme for this area is to defer new road construction. Management activities in this watershed that pose any risk to the aquatic condition should be deferred until other important aquatic habitats in the subbasin have been restored.

Vegetation

***Themes* -** Lower and West: Restore ponderosa pine (High Priority). Upper: Restore whitebark pine (Very High Priority).

Lower and West Johns Creek Background and Findings - On warm sites along the lower canyon, and adjacent uplands (VRUs 3 and 4), plant communities were historically shaped by low and mixed severity fire, and featured ponderosa pine and Douglas-fir, as well as grand fir, western larch, and lodgepole pine. Fire suppression and forest succession have resulted in declines in open pine stands, and increases in grand fir and Douglas-fir. Timber harvest in west Johns Creek has also contributed to the loss of large open pine stands. Restoring ponderosa pine is appropriate in this area, but the priority may be lower than ERUs where extensive harvest has more significantly reduced pine dominance.

Lower and West Johns CreekTreatment Objectives - Disturbance activities in subwatersheds as often as every 10 to 30 years may be appropriate in these VRUs. About 22,600 acres of VRUs 3 and 4 potentially suitable for ponderosa pine restoration occur in this ERU.

Upper Johns Creek Background and Findings - Much of upper Johns Creek has glaciated slopes subject to infrequent mixed fire (VRUs 1, 2 and 9). These areas once included a minor to important whitebark pine component.

Upper Johns Creek Treatment Objectives - Repatterning of vegetation can be done while restoring whitebark pine presence in these areas. Much of this upper elevation area is wilderness, and prescribed natural or management-ignited fire can be instrumental in whitebark restoration. Fire or other disturbance 0 to once every 35 years is needed in the wilderness to provide sites for whitebark pine reestablishment. About 46,700 acres of VRUs 1, 2 and 9 potentially suitable for restoration of whitebark pine occur in this ERU.

Wildlife

Themes - Restore ponderosa pine (Very High Priority), Produce early seral habitat (Very High Priority), Conserve late seral habitat (Moderate Priority).

Background and Findings - Johns Creek's is particularly important to wildlife due to its large size, varied topography, partial wilderness designation and linkage from alpine habitat all the way down to the South Fork Canyon. Johns Creek's most unique features are the extensive ponderosa pine forest (second only to South Fork Canyon), and large unroad area, which provides an important refugia for disturbance-sensitive wildlife, particularly mature bull elk. Johns Creek also harbors the South Fork subbasin's only mountain goat herd. The herd was introduced in 1961, and has been relatively stable for the last several years. Species of particular concern include lynx, elk, and black-backed woodpeckers (early seral dependents), boreal owl, pileated woodpecker, and Northern goshawk (late seral dependents), and flammulated owl (ponderosa pine dependent).

Treatment Objectives - Restore ponderosa pine (VRUs 3 and 4): Flammulated owls are intended to be the primary beneficiaries of this theme. The goal should be to create stands with an overstory of old growth (greater than 150 year old) ponderosa pine/Douglas-fir with multiple canopy layers, low tree density, moderate to low canopy closure, and moderate ground cover. The highest priority for such management are those stands that would result in the most immediate benefit to flammulated owls. Such stands are characterized as older than 60 years, with ponderosa pine forest types (or Douglas-fir forest types with a strong component of overstory ponderosa pine), are on ridgetops to midslopes, have slopes less than 45%, and are between 3600 and 6200 feet in elevation. Existing high-quality flammulated owl habitat with canopy closure >70% should be seriously considered for thinning. Flammulated owl presence/absence surveys should be conducted before any timber harvest or prescribed burning is implemented in such stands, to help ensure that existing flammulated owl "clusters" would not be impacted. Wintering elk would also benefit from the grass and brush understories that would result from this theme.

Produce early seral habitat: The purpose of this theme is to benefit black-backed woodpecker (VRUs 1, 3, 4, 5, 6, 7 and 10), wintering elk (VRUs 3, 4 and 12), and lynx (VRUs 1, 2, 4, 5, 6, 7, 9 and 10). To improve habitat conditions for black-backed woodpecker and lynx, burning or partial harvest and burning should be concentrated in lodgepole pine. Creating habitat for wintering elk could be accomplished by either fire or timber harvest. Currently, 10% of Johns Creek is in early seral habitat, with an additional 8% of fire-climax ponderosa pine habitat. Optimally, 40% and 30% of suitable habitat would be in an early seral condition for elk and lynx respectively.

Conserve late seral habitat: Johns Creek provides habitat for boreal owl, pileated woodpecker, and Northern goshawk, with the most extensive need for old growth being that of the pileated, which requires 24% of suitable forest to be overmature or old growth. Currently, 17% of Johns Creek is comprised of suitable late seral forest (VRUs 3, 4 , 6, and 7). Approximately 23% of the drainage as a whole is in late seral habitat.

Recreation

Themes - Lower and Upper: Provide trail recreation (High to Very High Priority). West: Provide roaded recreation and Conserve scenic integrity (Moderate Priority).

Background - Lower Johns is a popular horseback riding and hiking area close to surrounding communities. The Square Mountain road in Upper Johns is a popular yearlong corridor to the Gospel-Hump Wilderness. Hungry Ridge in West Johns Creek has valued scenic features, such as old ponderosa pine stands and the American Creek meadow complex.

Treatment Objectives - Emphasis should be on providing nonmotorized trail access in Upper and Lower Johns Creek. The Square Mountain road will become an increasingly important access to the Gospel-Hump Wilderness. Maintaining the road at regular intervals is important. Dispersed sites should be developed as needed to accommodate additional use from hunting, camping and trail use on the Hungry Ridge and Square Mountain roads. There should be no development in or along Johns Creek which would alter the potential for classification as a Wild River under the Wild and Scenic Rivers Act.

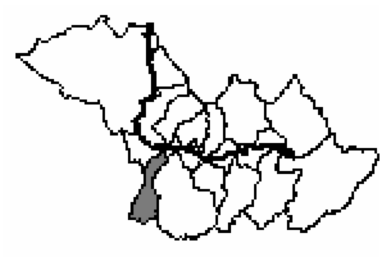
Roads

Themes - Lower Johns: Defer new roads. West Johns: Maintain core road system and reduce adverse effects throughout. Upper Johns: Wilderness...roads not applicable.

Background and Findings - Roads have been developed in the Johns Creek drainage to an appreciable level only in West Johns. The Gospel road, an important recreational access route into the Gospel-Hump Wilderness, enters the Upper Johns drainage in places. Existing road density in Johns Creek is approximately 0.5 miles per square mile of land. This figure includes some mileage that has recently been obliterated.

Treatment Objectives - The defer new roads theme for Lower Johns is not absolute. It is recognized that some limited access may be needed for vegetative treatment and other objectives in VRU 1. Reductions in road effects is well under way in West Johns Creek, where some roadway segments are being selectively obliterated. Continuing appropriate road maintenance on the remaining roads is important. Most of Upper Johns is within the Gospel-Hump Wilderness, therefore, roads are not compatible.

Mill Creek Ecological Reporting Unit



Area Themes - Lower Mill: Restore aquatic processes and Restore ponderosa pine. Upper Mill: Restore aquatic processes.

Location and Size - Mill Creek ERU encompasses an area approximately 23,000 acres in size. The ERU extends south from the mainstem South Fork to an area near Adams Camp. See Map 7.

Aquatic

***Theme* -** Restore Aquatic Processes (High Priority)

***Background* -** Mill Creek is a long, linear watershed (23,325 acres), of particular importance to steelhead and westslope cutthroat. This watershed is composed primarily of ALTA 3, with the upper subdivision made up of ALTA 6 and 1 (Map 6). The hydrologic regime for most of the watershed is zone 3, with a small amount of zone 1 and 2 in the upper subdivision.

The mainstem of Mill Creek is predominately a B channel type, with C channels and meadow openings in the upper watershed. The habitat potential of Mill Creek is rated low to moderate for spring chinook and bull trout, high for steelhead (lower subdivision), and very high for westslope cutthroat (upper subdivision) (Maps 33a, 34a, 35a, 36a).

Mill Creek has had a moderate level of management activity. Grazing activities have affected stream and riparian process in the upper watershed. Some of this has been addressed through grazing administrative action and conditions appear to be improving (Map 15). There have been about 4,500 acres of timber harvest in the watershed (20% of the area). About 590 acres of this is in the RHCA (Map 12). There are 94 miles of existing road (2.6 mi/sq mi). A little over 20 miles of this are in the RHCA (Maps 13, 14). The road adjacent to the lower mainstem encroaches on stream/riparian process (Map 15). About half the watershed remains in large areas of low development. Of particular value is a very large block along the mainstem channel for much of its length (Map 21). The current ECA in Mill Creek is 8%, and the current sediment yield is 8% over natural base. The overall condition rating for this watershed is low (Map 30). The Forest Plan fish/water quality objective for this watershed is 80% (Map 31). The current condition is considered to be below this objective (Map 32).

***Findings* -** Management activities in Mill Creek have affected aquatic processes, principally in the upper subdivision (where the historic disturbance was infrequent) and along the mainstem channel where encroaching roads and/or grazing effects have altered stream/riparian processes. Aquatic conditions in this watershed have been degraded from these activities.

Mill Creek has spring chinook, steelhead, and westslope cutthroat present in the drainage. There has been one sighting of bull trout. Westslope cutthroat and steelhead populations in this watershed are considered strong, and this watershed is considered a population stronghold for these two species (Maps 35b and 36b). This watershed is considered adjunct degraded habitat for spring chinook and bull trout (Maps 33b and 34b).

***Recommendations/Treatment Objectives* -** The recommended aquatic theme for the Mill Creek watershed is restore aquatic processes, high priority (Map 48). The strong populations of westslope cutthroat and steelhead make this an important watershed to restore. The restoration needs to focus on stream/riparian processes affected by grazing in the upper mainstem, and on the existing road system and other upland sediment sources.

This watershed has both the aquatic potential and the current building blocks necessary to restore aquatic processes in this watershed. The recommended area themes for this watershed are both the aquatic restoration theme and the vegetative theme of ponderosa pine restoration in the lower subdivision, and aquatic restoration in the upper subdivision.

Vegetation

Themes - Lower: Restore ponderosa pine (High Priority). Upper: Conserve existing vegetation pattern (Moderate Priority)**.**

Lower Mill Creek Background and Findings - This ERU includes the mostly steep lands near the River (VRU 3) and the lower elevation uplands influenced by the nearby canyon (VRU 4). In these areas, plant communities were historically shaped by low and mixed severity fire, and featured ponderosa pine and Douglas-fir, with some grand fir, western larch, Pacific yew, and Engelmann spruce. Fire suppression, forest succession, and timber harvest have resulted in declines in open pine stands, increases in grand fir and Douglas-fir, and losses of patch size diversity and snags. Significant areas of fire risk outside the historic range (See Map 46) occur in this area, made more complex by intermingled land ownership.

Lower Mill Creek Treatment Objectives - Disturbance activities in subwatersheds as often as every 10 to 30 years may be appropriate in these VRUs. Restoring ponderosa pine, more open stands, more diverse patch size, snag patches, and large overstory ponderosa pine, western larch and Douglas-fir are priorities in this part of the ERU. About 14,600 acres of VRU 3 and 4 potentially suitable for the pine restoration theme occur in this ERU.

Upper Mill Creek Background and Findings - These areas are colder (VRUs 1 and 5) and were more subject to infrequent mixed and stand replacing fire. Grand fir, Douglas-fir, Engelmann spruce, western larch, lodgepole pine and Pacific yew were more important than ponderosa pine. In these areas, harvest entries have been traditionally dispersed, mostly clearcut, and more frequent than historical fire disturbance. Complex multi age old growth (VRU 5), diversity of patch size, and abundance of snags and down wood have been lost.

Upper Mill Creek Treatment Objectives - Disturbance activities can occur in a subwatershed no more than once in about 35 years to help recover watershed function and treatments scaled more in harmony with historic process. Working to maintain seral lodgepole pine and western larch on ridges, produce some early seral patches, maintain some complex stand structures and old growth, provide snags in small patches or individuals, and provide greater variety of patch size comprise the theme in upper Mill Creek. About 8,600 acres of VRU 1 and 5 potentially suitable for conserving existing vegetation pattern occur in this ERU.

Wildlife

Themes - Restore ponderosa pine (Very High Priority), Produce early seral habitat (High Priority), Enhance wildlife security (Low Priority).

Background and Findings - Mill Creek provides important habitat for wintering elk. Lower Mill Creek has potential for flammulated owl, but is likely unoccupied currently due to the effects of past timber harvest and fire exclusion.

Treatment Objectives - Restore ponderosa pine (VRUs 3 and 4): Flammulated owls are intended to be the primary beneficiaries of this theme. The goal should be to create stands with an overstory of old growth (greater than 150 years old) ponderosa pine/Douglas-fir with multiple canopy layers, low tree density, moderate to low canopy closure, and moderate ground cover. The highest priority should be those stands that would result in the most immediate benefit to flammulated owls, and are characterized as being older than 60 years, with ponderosa pine forest types (or Douglas-fir forest types with a strong component of overstory ponderosa pine), on ridgetops to midslopes, have slopes less than 45%, and are between 3600 and 6200 feet in elevation. Flammulated owl presence/absence surveys should be conducted before any timber harvest or prescribed burning is implemented in targeted stands, to help ensure that existing flammulated owl "clusters" would not be impacted. Wintering elk would benefit from the resulting grass and shrub understories.

Produce early seral habitat: The purpose of this theme is to benefit elk (VRUs 3, 4 and 12), and could be accomplished by either fire or timber harvest. To allow maximum elk use of forage, no clearcuts should be greater than 1000 feet wide. The goal should be to maintain 40% of VRUs 3, 4, and 12 in early seral or fire-climax ponderosa pine habitat. Currently, only 10% of the ERU is in early seral habitat, while 3% provides fire-climax habitat suitable to wintering elk.

Enhance wildlife security (all VRUs): This theme is focused on improving the availability of wildlife security for elk during the non-winter period. One of the four Elk Habitat Units within this ERU is more than 5 points below its objective. Site specific proposals to increase wildlife security should be examined in this area whenever recreation opportunities or road or trail changes are proposed.

Recreation

Themes - Lower: Provide roaded recreation (Moderate Priority). Upper: Provide trail recreation (Moderate Priority).

Background - Lower Mill is contiguous with West Johns and is a popular area for motorized dispersed recreation from Hungry Ridge to Adams Camp. Upper Mill is accessible by a popular ORV trail and trailhead at Corral Creek. The emphasis is to provide roaded recreation and motorized trail opportunities.

Treatment Objectives - Additional planning is needed for dispersed campsites, trailhead parking, and trail maintenance to accommodate use and protect facilities. An opportunity to develop a seasonally restricted motorized trail loop from Corral Creek including Marble Point, American Creek, Mill Creek and Asbestos Peak trails (in the Slate Creek drainage) should be assessed. The Adams Ranger Station should be protected. Historical interpretation and protection are appropriate.

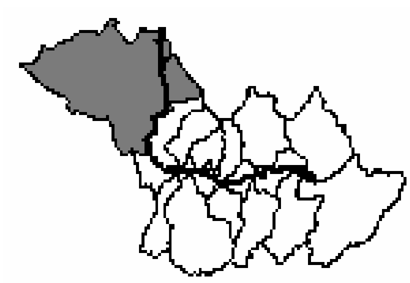
Roads

Themes - Upper and Lower Mill: Maintain a core road system and reduce adverse effects throughout.

Background and Findings - Existing road density in Mill Creek is approximately 2.6 miles per square mile of land.

Treatment Objectives - Reductions in sedimentation through road maintenance, reconstruction and road management is the primary focus. An evaluation of reconstruction and mitigation possibilities of the lower 6 miles of the Hungry Ridge road is recommended.

Camas Prairie Ecological Reporting Unit



Location and Size - Camas Prairie ERU encompasses an area approximately 199,000 acres in size. The ERU includes the private land and other ownership west of the Forest Boundary. See Map 7.

Overview

Most of this ERU is in private ownership. It includes the basalt plateau of the Camas Prairie, and the steep canyons at lower elevations along the larger streams and the South Fork Clearwater. The landscape was once dominated by grassland and shrubland steppe on the prairie and a mosaic of grassland, shrubland and open ponderosa pine and Douglas-fir in the canyons. Cottonwood, Grangeville, Harpster, Kooskia, Stites, and Clearwater are centers of residential development. The findings for this ERU are more general than the others, since it contains minimal National Forest land and an indepth analysis was not attempted. For these same reasons, coordination opportunities are presented, rather than recommendations.

Summary of Findings

Aquatic: Streams in this ERU are among the most heavily impacted in the subbasin. In those reaches on forested lands, stream conditions are probably comparable to other parts of the subbasin, where similar levels of disturbance have occurred. Conversely, most streams on agricultural lands have been highly modified by riparian tree and shrub removal, field plowing, channelization, channel erosion, sediment yield, and sediment deposition. Livestock feedlots and season-long grazing have impacted certain reaches. As the streams flow from the Camas Prairie via breaklands to the mainstem South Fork, erosion of channels is common due to steeper gradients and altered upstream and riparian conditions. When these streams reach the South Fork valley floor, their gradients drop considerably, and substantial deposition of bedload sediment has resulted in aggraded channels. Fish habitat in tributary streams has changed significantly from historic conditions. Impacts include wider, shallower channels, loss of pools, loss of riparian shading, warmer summer water temperatures, and substantially increased sediment yields.

The lower South Fork Clearwater River flows through this ERU. Its sensitivity to disturbance varies between confined and unconfined reaches, with the latter being more sensitive. The lower reaches of the South Fork have been affected to various degrees by aggradation, channelization, diking, riparian vegetation removal, and encroachment by developments, such as roads and buildings. Aggradation of the river is associated with bedload from upstream sources, but most noticeably from the major Camas Prairie tributaries (e.g. Butcher, Threemile, and Cottonwood Creeks) and local bank erosion. In the unconfined reaches, the net result is a channel that is wider, shallower, and with less large pools than existed under natural conditions. Fish habitat has been affected through less cover, less deep holding water, elevated sediment yields, and warmer summer water temperatures. In some years, much of the lower South Fork becomes unsuitable for cold water salmonids due to warm water temperature. For fish species that migrate through this area, either to reach upstream spawning areas or downstream migration of juveniles, the habitat loss in the main stem has reduced connectiveness and rearing capability.

Vegetation: Annual grasslands and noxious weeds have become established on grassland habitat types on low elevation steep south facing slopes. This has resulted in loss of bunchgrass community structure, diversity, and habitat for dependent wildlife populations. On the prairie, native bunchgrasses and shrublands have been largely replaced by annual crop land, hay, or pasture. Once extensive camas fields are now generally limited to nontillable areas. Significant areas of open ponderosa pine in the canyons have been lost to timber harvest, and conversion to agricultural uses or shifted to Douglas-fir with succession and fire suppression.

Wildlife: Historical elements no longer present or much reduced include Columbian sharp-tailed grouse, burrowing owl, and mountain quail.

Air Quality: Air quality in this ERU is generally good, however, air quality is adversely affected by field plowing, agriculture burning and native surfaced and gravel roads open year round to travel. The degradation of the air quality is cyclic, corresponding to dry field conditions for plowing in the spring and fall and dry weather for burning agriculture stubble in the fall. Incentives through the Farm Program to keep residue on highly erodible soils has reduced agriculture burning the past several years. Normally, good transport winds quickly disperse the effects of all air quality degradation, keeping the general air quality good.

Opportunities for Cooperative Work

Aquatic Monitoring and Restoration: Cooperative water quality monitoring efforts have been undertaken in the lower South Fork, with the primary agencies being the US Geological Survey, Idaho Division of Environmental Quality, and Nez Perce National Forest. These efforts are expected to continue, and possibly expand, both in scope and with respect to the number of agencies involved.

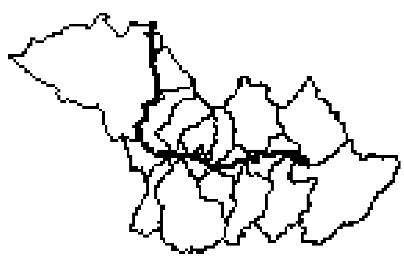
Numerous interagency efforts are underway at the scale of the Clearwater River Basin to address aquatic conditions and needs. These include a Basin Advisory Group and Technical Advisory Team dealing with Water Quality Limited Streams and implementation of the Governor's Bull Trout Plan. Another basinwide effort is the Clearwater Focus Program, which is funded by the Bonneville Power Administration and jointly administered by the Idaho Soil Conservation Commission and the Nez Perce Tribe. The Nez Perce National Forest has been involved in these efforts.

The Cottonwood Creek Soil and Water Quality Project is an example of an interagency effort underway within this ERU. A Watershed Advisory Group was recently formed for Cottonwood Creek, a Water Quality Limited Stream, to recommend specific actions needed to restore water quality. Nez Perce National Forest aquatic personnel have periodically provided technical assistance on public and private projects within the Camas Prairie ERU, typically at the request of State and local agencies.

Noxious Weed Control: The Forest Service is working with Idaho County in a cooperative effort to manage noxious weeds in the South Fork of the Clearwater River. The intent of the partnership is to develop common objectives and priorities for the management of specific noxious weeds found in the basin. Personnel and equipment may be pooled to efficiently utilize available skills in the control and management of high priority noxious weeds. A larger committee has been formed to coordinate weed management across the Clearwater River Basin. This committee includes Idaho, Nez Perce, Lewis, Clearwater and Latah Counties, Clearwater and Nez Perce National Forests, Cottonwood Resource Area-BLM, Clearwater RC&D, Idaho Department ofFish and Game, Idaho Department of Lands, Idaho Transportation Department, and other interested groups and organizations. Opportunities exist to continue to cooperate with all the weed control partners in the Clearwater drainage.

Fire Suppression: The Forest Service cooperates with the State of Idaho for fire suppression, fire prevention, fire training and fuels treatment. Opportunities do exist to cooperate with rural fire departments , however, there are only a few organized rural fire departments at this time that have jurisdiction in this ERU. As more fire departments become organized then the opportunity exists for cooperation in fire training, fire prevention, surplus equipment acquisition, and fire suppression in the urban interface.

Chapter 5 - SUBBASIN SUMMARY



Area Theme - Restore and Conserve aquatic and terrestrial conditions. Focus restoration and conservation efforts in areas where long term ecosystem sustainability may be at risk and/or where resource values and capabilities are high. Reduce road related effects. Initiate a subbasin approach to road obliteration, relocation, and stabilization. Defer management activities in areas which currently serve as refugias to recovering aquatic species. Use collaborative planning in addressing restoration and conservation needs.

Overview

The South Fork Clearwater Subbasin encompasses about 752,000 acres, of which 515,000 acres are under National Forest management. The historic landscape varied from the grassland steppe of the Camas Prairie, to pine forested low elevation canyons, to mid elevation uplands like the Elk City Township, to high elevation glaciated slopes like the Gospel-Hump area. Streams in the subbasin support spawning and rearing habitat for Chinook Salmon, Steelhead, Bull Trout, and West Slope Cutthroat Trout. Two rivers (South Fork Clearwater and Johns Creek) are eligible for Wild and Scenic classification. An active mining history has resulted in both cultural legacies and lasting ecological impacts to some streams. Plant communities were shaped by recurrent wildfire, which was instrumental in sustaining the diversity of habitats and species in the landscape. Fire and climatically related hydrologic events caused aquatic habitat conditions to vary over time at any one place, but well connected patches of suitable habitat were maintained throughout the subbasin over time. The most important ecological changes to the subbasin include the alteration of disturbance regimes, isolation and fragmentation of aquatic and some terrestrial habitats, the introduction of nonnative species, and the extirpation of some native species.

Fire frequency has decreased to less than 10 percent of historical occurrence. Timber harvest has replaced fire as a dominant vegetation disturbance process, but has not sustained the diversity of pattern, composition, or structure of communities and habitats. The most important changes in forested wildlife habitats have been the loss of fire-killed trees due to suppression of stand replacing fires, loss of fire-climax ponderosa pine forest due to suppression of ground fires, reductions in early and late seral habitats, and loss of wildlife security areas from road and trail access.

Departures from historic aquatic conditions have occurred over large areas in the subbasin, and are most apparent in landscapes which were highly dependent on large, infrequent disturbances found in the mid to upper elevation area of he subbasin. These areas are now more closely associated with small to moderate scale, frequent disturbances associated with road systems and timber harvest. There are also large areas of low development in the subbasin, where aquatic conditions are similar to historic conditions. Fish species at risk are still well distributed throughout the subbasin and their habitats are physically connected. However, fish populations are depressed and their habitat is degraded. In addition, a reduction in the number of migratory fish has caused a loss of population connectivity, thus, increasing the risk of local extirpation.

Isolation and fragmentation of terrestrial habitats have occurred with the loss of extensive continuous areas of open ponderosa pine along the canyon. Isolation and fragmentation of aquatic habitats has been more extensive, particularly in the mainstem tributaries including Red River, Crooked River, American River and Newsome Creek.

Table 5.0 - Management Themes - South Fork Clearwater Subbasin

Location or ERU	VRU	Aquatic Theme	Aquatic Priority	Veg Theme	Veg Priority	Wildlife Theme	Wildlife Priority	Rec Theme	Rec Priority	Road Theme	Proposed Area Theme
Lower SFk Canyon	3/4	Rap	M	Rpp	H	RppPesh	VH/VH	Pdr/Csi	VH	2	Rpp/Csi
Upper SFk Canyon	6	Rap	M	Rvp	M	Pesh	VH	Csi	VH	2	Rvp/Csi
Lower Meadow	4/3	Rap	H	Rpp	H	Rpp	VH	Prr/Ptr	M	2	Rap/Rpp
Upper Meadow	7/10	Rap	H	Cevc	M	Ewls/Clsh	M/L	Prr	L	3	Rap
L. Cougar-Peasley	3/4	Rap	M	Rpp	H	Rpp/Pesh	VH/VH	Prr/Ptr	M	2	Rpp
U. Cougar-Peasley	7/10	Rap	M	Cevc	L	Clsh	L	Prr/Ptr	M	3	Cevc/Clsh
Lower Silver	3/4	Ceaf	M	Rpp	H	Rpp/Pesh	H/VH	Ptr	M	4	Rpp
Upper Silver	10/7	Ceaf	M	Cevc	L	Clsh/Ewls	L/M	Ptr	M	1	Cevc
Lower Newsome	6/3	Rap	VH	Rvp	M	Clsh/Ewls	M/M	Prr	M	3	Rap
Upper Newsome	7/10	Rap	VH	Cevc	L	Clsh/Ewls	M/M	Prr	M	3	Rap
Lower American	6	Rap	H	Rvp	M	Pesh	VH	Prr	M	3	Rap
Upper American	10/7	Rap	H	Cevc	L	Pesh	M	Ptr	VH	2	Rap
Lower Red River	6/3	Rap	VH	Rvp	M	Pesh	VH	Pdr/Ptr	VH	3	Rap
Mid Red River	4	Rap	VH	Rpp	M	Pesh	VH	Csi	H	3	Rap
Upper Red River	1	Rap	VH	Rwbp/Rvp	VH/M	Pesh	VH	Prr	M	2	Rap/Rwbp
Lower Crooked	6/3/7	Rap	VH	Rvp	M	Pesh	M	Prr	H	2	Rap
Upper Crooked	1	Ceaf	VH	Rwbp/Rvp	VH/M	Pesh	H	Prr	M	1	Ceaf/Rwbp
Lower 10 Mile	6/3	Ceaf	VH	Rvp	L	Clsh	M	Prr	L	1	Ceaf
Upper 10 Mile	1/2/9	Ceaf	VH	Rwbp	VH	Clsh/Pesh	M/M	Ptr	H	5	Ceaf/Rwbp
Lower E.Wing 20	6	Ceaf	H	Rvp	M	Clsh	L	Ptr	L	4	Ceaf/Rvp
Lower W.Wing 20	7/3	Ceaf	M	Cevc	L	Clsh	L	Ptr	L	4	Ceaf/Cevc
Upper Wing 20	1	Ceaf	H	Rwbp	VH	Clsh	L	Ptr	H	1	Rwbp
Lower Johns	3/4/6	Ceaf	VH	Rpp	H	Rpp/Pesh	VH/VH	Ptr	H	1	Ceaf/Rpp
West Johns	6/5	Rap	H	Rpp	H	Rpp/Clsh	H/M	Prr	M	2	Rap/Rpp
Upper Johns	1/2/9	Ceaf	VH	Rwbp	VH	Pesh/Clsh	VH/M	Ptr	VH	5	Ceaf/Rwbp
Lower Mill	3/4	Rap	H	Rpp	H	Rpp/Pesh	VH/H	Prr	M	2	Rap/Rpp
Upper Mill	5/1	Rap	H	Cevc	M	Clsh/Ewls	M/L	Ptr	M	2	Rap

Vegetation and Wildlife

Rpp = Restore ponderosa pine

Rwbp = Restore whitebark pine

Rvp = Restore vegetation pattern

Cevc = Conserve existing vegetation conditions

Clsh = Conserve late seral habitat

Pesh = Produce early seral habitat

Ewls = Enhance wildlife security

Aquatics

Rap = Restore aquatic processes

Ceaf = Conserve existing aquatic function

Recreation

Csi = Conserve scenic integrity

Pdr = Provide developed recreation

Ptr = Provide trail recreation

Prr = Provide roaded recreation

Roads

1 = Defer new roads

2 = Maintain core road system and reduce adverse effects throughout

3 = Reduce adverse effects with an emphasis on reducing overall road densities

4 = Develop and maintain the road system. Focus on maintaining the existing road system

5 = Wilderness...roads not applicable

Priority describes the importance and urgency in implementing the theme relative to other actions within a specific rsource group i.e aquatics.

Proposed Area Themes are recommendations which describe the primary emphasis for an area after integrating and considering all functional resource themes.

VH=very high, H=high, M=moderate, L=low

Introduction of nonnative species has most significantly altered bunchgrass and shrub steppe communities. Conversion of grassland steppe on prairie and hill slopes to cropland, hay, and pasture, has been extensive on private lands. Annual grasslands and noxious weeds have become established on grassland habitat types on low elevation steep south facing slopes. Blister rust has highly altered whitebark pine communities. Introduced brook trout have become established in several streams.

Several wildlife species have been extirpated from the South Fork Clearwater Basin in the last century, including Columbian sharp-tailed grouse, burrowing owl, and grizzly bear. Several more, such as mountain quail, white-headed woodpecker, and gray wolf have been nearly extirpated.

Timber harvest has and continues to play an important economic role in supporting local communities. Recreation use is increasing and the need to maintain scenic integrity is also high in the subbasin. Recreation use is mostly associated with dispersed recreation activities such as hunting, fishing, driving for pleasure, and camping.

Summary of Recommendations for the Subbasin

Vegetation

These recommendations summarize the themes and how they address the major changes identified in this assessment: alteration of disturbance regimes, declines in certain terrestrial communities and habitats, and the introduction and expansion of nonnative species.

- The restore ponderosa pine theme emphasizes a pattern of low to mixed severity, very high and high frequency disturbance to low elevation forests, at small to moderate scales. This theme addresses the loss of open stands of large old pine and bunchgrass communities on dry aspects, and loss of diversity of stand structure and declines of pine or larch on north aspects. Burning, thinning or low to moderate intensity harvest, and weed treatments are needed to recover these elements and provide for species including flammulated owl. Some early seral habitat will also be provided, and historic levels of old growth recovered or maintained. Priority for scheduling treatment is **High**.
- The restore whitebark pine theme emphasizes a moderate to low frequency disturbance regime (usually fire) to high elevation forests that supported whitebark pine. Inventory, collection, protection, and propagation of whitebark pine are needed to reduce its serious decline. This will also produce some early seral habitat and reduce encroachment by spruce-fir forest which has increased beyond historic extent. Priority for scheduling treatment is **Very High**.
- The restore vegetation pattern theme emphasizes low frequency mixed severity and broad scale disturbances in interior mid-elevation forests. This theme addresses the decline in lodgepole pine and larch, and increases in spruce-fir forest above historic levels. Moderate intensity harvest with burning will provide more early seral habitat, including extensive snag patches. It also will provide more early seral habitat including extensive snag patches. The infrequency of disturbance will better provide for aquatic recovery and wildlife security. Old growth will be maintained at historic levels. Priority for scheduling treatment is **Moderate**.
- The conserve existing condition theme emphasizes a pattern of mixed severity, low frequency disturbance to mid elevation moist forests, at small to moderate scales. This theme addresses issues of wildlife security, mesic old-growth dependent species, and retention of forest age class and species diversity suited to this climatic setting. Old growth will be maintained at historic levels. Priority for scheduling treatment is **Moderate**.

Snags and Coarse Down Woody Material

Forest Plan standards for snags are inadequate. Snag standards were based on minimum requirements of certain indicator species (like pileated woodpecker), but monitoring of timber harvest units (USDA Forest Service, 1993 Monitoring and Evaluation Report) indicates that adequate numbers of snags may not be designated for retention, may be cut down for safety reasons during harvest, may be lost during slash treatment, may fall shortly after harvest, or may be cut for firewood. The large patches of snags that once occurred as a result of periodic wildfire, either do not occur due to fire suppression or are often lost to post-fire salvage harvest. Standards for coarse down woody material were not developed for the current Forest Plan, although the importance of this material is well recognized (Harvey et al., 1987).

The recommendations in Appendix D for snags, green tree replacement snags and coarse woody debris are adapted from the Payette National Forest in response to their fires of 1994 (USDA, 1995), but they have been applied to harvest as well as burned areas. The intent is to provide for numbers of snags, replacement snags, and coarse woody debris at levels more closely approximating historic levels to sustain dependent species and soil productivity.

Old Growth

Old growth standards in the current Forest Plan do not consider differences in old growth type, natural patterns of old growth in the landscape, and disturbance regimes that sustained certain old growth types, like open ponderosa pine. The extent, distribution and kinds of old growth resulting from minimum compliance with existing old growth standards fall well below historic levels for certain old growth types (like ponderosa pine or moist grand fir). The intent of the recommendations for old growth shown in Appendix F is to provide kinds, amounts, and distribution of old growth closer to historic levels that sustained dependent species. Restoration of the disturbance regimes that maintained certain types of old growth (low and mixed severity fire) is also needed. Timber harvest may sometimes be compatible with restoration of certain old growth types. The old growth recommendations in Appendix F are interim recommendations until more substantive analysis can occur.

Road Management

Road management is fundamental to integrating human influence with other components of ecosystem function. Roads help people to use the National Forest for many purposes, including recreation and vegetation treatment. They also have the potential to produce long lasting, negative impacts on the resources and uses of the National Forest, including fish and wildlife species and primitive recreational experiences.

The goal of road management in the South Fork subbasin is to better align, to the extent possible, the disturbances attributable to roads and their uses, with the historic natural disturbance pattern. It is assumed that, to the extent that these road disturbances can be aligned and made compatible with the frequency and scale of natural disturbances, the roads represent less of a risk to ecosystem function and best provide for long term sustainability. While there is no real natural equivalent to roads, this set of four recommendations for roads in the subbasin shown below, would align the roads, as closely as possible, to historic disturbance regimes.

1) Design Road Development Activities and Carry Out Road Management Strategies within the Context of Landscape Setting and Historic, Natural Disturbance Regimes: Road development activities and road management in the subbasin should be managed under a variety of transportation concepts that fit the disturbance regime for the area. The two roading strategies presented below represent the bounds of the road management spectrum for the landscapes in the subbasin. The rest of the subbasin, from a roading standpoint, should be treated as a continuum between these two bounds. Within all of these areas, road densities should vary, given the specific landscape setting and resource values. It is anticipated there would need to be a transition from the road network that currently exists, to the desired transportation system throughout the subbasin. Again, the amount of change will vary, depending on the resource values, existing development, and disturbance regime.

- ❑ In the lower subbasin (VRU 3), the historic natural disturbance regime was frequent, thus, the vegetation theme (Table 5.0 - restore ponderosa pine) recommends corresponding, frequent vegetation treatments (10-75 years). For a more complete description of the vegetation objectives, see the lower subbasin ERU discussions and Restore Ponderosa Pine theme description (pages 115 -116) in Chapter 4. The recommended transportation concept uses a comparatively large percentage of permanent roads, with some temporary roads associated with specific site objectives. Given the sensitivity associated with steep slopes in these landscapes, all roads need to be located precisely and well maintained.

Because of the steep sideslopes, it is likely that vegetative treatments utilizing harvest would rely heavily on aerial or skyline logging systems.

- In the upper subbasin (VRU 6), where the historic natural disturbance regime was infrequent, but affected much larger areas, the vegetation theme is to restore the vegetative pattern (Table 5.0). The magnitude and scope of the current aquatic press disturbance in the upper subbasin, which contains some of the highest aquatic values in the area, should be reduced in order to transition to a more infrequent, pulse type disturbance regime. In this area, the transportation concept is one that uses a comparatively large percentage of temporary roads, referred to as ephemeral roads. From a network of permanent access roads, large blocks of vegetation should be treated with primarily temporary roads that are removed after that treatment. For a more complete description of the vegetation objectives, see the upper subbasin ERU discussions and the Restore Vegetation Pattern theme description (pages 116 -117) in Chapter 4.

  This roading concept is consistent with the recommended vegetation treatment frequency of 75-150 years. Harvest treatments would utilize primarily ground-based or skyline logging systems. Due to the importance of the aquatic resources and their potential, the recommended management goal is to focus on areas with high road densities, implement needed vegetation treatments, and aggressively remove excess roads from the area when the treatments are completed. This strategy should bring the aquatic and vegetation dynamics into much closer alignment, consistent with historic disturbance regimes. This strategy should not be misinterpreted as a recommendation to construct roads and treat vegetation in the few remaining blocks where development is minimal or has not occurred. The key is to focus on areas with high existing road densities. Continuing with the past harvest strategy of dispersed, small to medium sized (5 to 40 acre) patch clearcuts (and associated roading), will only prolong a situation where the aquatic resources remain in a state of active press disturbance and restoration of the aquatic systems is never give a chance to begin.

  This recommendation for large block treatments in high road density areas, and the use of mostly temporary roads in the upper subbasin is not a casual recommendation made without understanding the significance of the changes that will need to occur in order for this to be implemented. Public input, understanding and acceptance will take time.

2) Use Ecosystem Analysis at the Watershed Scale (EAWS) to Develop Site Specific Road Management Plans: The road themes are recommended as general direction for various parts of the subbasin (Map 52 and Table 5.0). Through EAWS, these road themes should be verified and more specific transportation recommendations developed. The EAWS scale of assessment (usually at the 5th code HUC) is an appropriate scale for evaluating existing road and transportation networks, and allows transition to the future transportation strategy described previously. The EAWS scale evaluation of the transportation system allows for integration of functional objectives and public desires that is not possible at the stand scales, and also, provides the context for the establishment of specific road management objectives at the project level.

3) Decommission or Obliterate Unneeded Roads: Throughout the subbasin, there are many roads that could be considered excess roads to the current management objectives and public access needs. Many of these roads are the result of older access used for timber harvest and mineral investigation. A preliminary analysis indicates that up to twenty-five to thirty percent of the existing roads may be excess to the long term system needs. These roads should be evaluated by an interdisciplinary team, as part of ecosystem analysis at the watershed scale (EAWS), to determine their benefits and risks. Public involvement in this evaluation is very important to ensure that current and future uses and needs of these roads are not overlooked. For roads declared excess, appropriate measures should be taken to remove all or part of these roads. Scheduling and final obliteration plans should reflect the aquatic conservation strategy.

4) Emphasize Road Maintenance and Reducing Road-Related Effects: Timely and efficient road maintenance of existing roads is critical to the proper performance and function of the road system. Recent research has identified the importance of timely surface grading to control rut depth in reducing erosion. Maintenance of a properly functioning drainage system also remains paramount to ensuring the stability of road system components, including cutslopes, fill slopes, and the travelled way. Particular road maintenance emphasis should be placed on assuring recreation access and minimizing aquatic impacts.

Reducing road related effects should be a prime consideration in road reconstruction as well. Reconstruction activities, as identified through the EAWS process, will allow for improvements in the road network to address ecosystem needs, particularly aquatic function. EAWS should, in particular, give consideration to: 1) upgrading stream crossings to provide for fish passage and additional flow considerations, 2) providing a suitable surface to accommodate recreation traffic and minimize erosion from the travelled way, and 3) slope stability treatments on cutslopes and fillslopes to minimize potentials for initiation of mass wasting events.

Recreation Facilities

The South Fork subbasin provides a wide variety of developed and dispersed recreation opportunities. Most developed campsites are found near the South Fork Clearwater River in the South Fork Canyon ELU. Elsewhere, dispersed campsites, trailheads, and historical and cultural feature interpretations can be found. As the recreation use grows, development of additional sites (both developed and dispersed) and trailheads should be explored. Big game hunting is an important use throughout the subbasin in the fall. Snowmobiling and cross country skiing are popular in the winter months. During the summer, the beaches and campgrounds adjacent to the South Fork Clearwater River are quite popular. Hiking, fishing and wildlife viewing are also favored activities in the late spring, summer and early fall. The Gospel-Hump Wilderness can be accessed via several key trailheads located near the southern boundary of the subbasin.

Both roaded and trail recreation opportunities are available throughout the South Fork subbasin. Roaded recreation opportunities are available primarily in the lower elevation portions of the subbasin, while trail recreation would dominate in the higher areas of the subbasin. In some areas, motorized recreation would have seasonal or yearlong restrictions to protect resource concerns. The dramatic increase in ORV use (including motorcycles, 4-wheelers and snowmobiles) should be closely monitored, to assure that quality ORV experiences and opportunities are maintained, while at the same time, reducing potential conflicts with other uses and resources.

The South Fork Clearwater River and Johns Creek are identified in the Nez Perce Forest Plan as eligible waterways for wild, scenic and recreation status. A suitability study will be completed at a later date. In the meantime, no management activities will be carried out that would alter the potential classification of the eligible waterways.

Aquatics

The aquatic resources of the South Fork Clearwater Subbasin are recognized as uniquely valuable, despite often being overshadowed by the high quality aquatic conditions that exist in the nearby Selway Subbasin. The inherent aquatic species potential of the South Fork Clearwater Subbasin probably exceeds that of the Selway Subbasin, given the greater amount of low relief uplands and associated high potential, in-stream habitat. The Nez Perce Forest Plan (effective October, 1987) established high expectations and objectives for most of the South Fork Clearwater Subbasin. This assessment is principally a reinforcement of those conclusions about species potential and aquatic restoration objectives. This assessment attempted to integrate functional objectives into an integrated recommendation on subbasin management. The historic disturbance pattern has been used as a template for these recommendations, and consequently the functional objectives are consistent. The recommendations presented here include both the integrated and aquatic resource specific recommendations:

- ❑ In areas where there has been large amounts of human activity, the pattern of human disturbance in the subbasin should be altered to more closely align with the pattern of historic disturbance (i.e. less frequent, wider extent disturbances in the upper subbasin and more frequent, maintenance-type disturbances in the lower subbasin). The transition from the current condition using this management approach is fundamental to restoration of the aquatic resources. Implementation of the vegetation and road themes for the subbasin, particularly the restoration of vegetative pattern and use of the ephemeral approach to roads in the upper subbasin, is central to aquatic restoration in these areas.

- ❑ Active rehabilitation of aquatic resource function, particularly the major tributaries of the upper basin, and a reduction in the effects of the existing road system, are also recommended to conserve the aquatic species in the subbasin. For anadromous fish species, downstream threats will also have to be corrected to stop the decline in these species.
- ❑ There are large areas of low development in the subbasin, particularly in the southern portion (Map 21). These areas are strongholds for steelhead, bull trout and westslope cutthroat trout. In these areas, conservation of existing aquatic function is critical to the conservation of these aquatic species.
- ❑ Conservation of these high quality areas should not be considered the only requirement for long-term species well being, but as short-term refugia for the species, while areas essential to their long-term persistence are restored. The aquatic themes express this restoration priority.
- ❑ In areas of the subbasin where the vegetation themes are emphasized more than the aquatic in the integrated area theme recommendation, restoration of aquatic function also needs to occur. Projects in these areas need to be an integrated effort that recognize the need for aquatic restoration throughout the subbasin, as it relates to conditions in the mainstem South Fork Clearwater River.
- ❑ Ecosystem analysis at the watershed scale (EAWS) is recommended for areas with high to very high aquatic restoration priority in the subbasin, to complete the higher resolution, finer scale planning needed to organize and accomplish the aquatic restoration. Transportation planning needs to be an important part of these EAWS efforts, integrating the variety of resource objectives and human perspectives.
- ❑ Partnerships are an essential ingredient in the successful restoration of aquatic resources in the subbasin. Cooperative work across the range of agencies, governments, industries, and individuals will be needed. The resources necessary to establish or strengthen these partnerships should be identified and focused on this effort.

Fire Management

Natural wildfire was a keystone process in the subbasin, affecting the pattern of forest vegetation, wildlife habitats, and aquatic states. Fire suppression from about 1935 to the present has highly altered those patterns, while road construction, mining, grazing and timber harvest have had substantial effects, but have seldom simulated the spatially patchy and episodic effects of fire.

Current risk of severe fire has probably increased in some areas as a consequence of successful past fire suppression. This risk poses threats to private property and safety, and, in some situations, may result in unnaturally severe fires that could cause habitat degradation outside the natural range.

There are some conditions under which timber harvest can successfully be used to restore vegetation structure and pattern. In some of these situations, fire will be needed in concert with harvest to treat fuels, reduce risk of more severe fire, provide snags, or favor regeneration of fire-dependent species.

It is important to recognize that there are areas where road construction and timber harvest are not likely to be appropriate given the sensitivity or condition of the watershed. Prescribed fire may be suitable in some instances where timber harvest is not suitable, either because road construction or harvest is not allowed (wilderness) or the impacts not tolerable. These may include:

- ❑ Areas of high RHCA density: Map 17
- ❑ Areas of high substratum erosion hazard: Map 18, and steep slopes
- ❑ Areas of high debris torrent hazard: Map 19

- ❏ Watersheds in which the road theme is defer new roads, or sometimes reduce road density: Map 49

In other areas, economic values of timber harvest are too marginal (high elevation forests or very open dry forests). In some areas, (especially VRUs 1, 8, 9, and some of 3 and 10), concerns about watershed impacts and marginal timber values have resulted in deferral of vegetation treatment, but continuance of a policy of fire suppression. Some of these areas today support the best remaining aquatic habitat (Johns Creek, Tenmile Creek, and Upper Crooked River), but some terrestrial components are well outside their fire disturbance interval (Johns Creek, for example). See Map 46.

Restoring fire to areas where timber harvest and road construction are not acceptable alternatives is probably fundamental to sustaining the full complement of plant communities, wildlife habitats, and aquatic states in the subbasin. It may be thought that allowing fire to play a larger role in the subbasin may pose risks in that fire may have less predictable outcomes than building roads and conventional harvest. However, we have found in this assessment that, while we may be better able to control the boundaries of roads and harvest units, we have not been able to adequately control their cumulative negative effects. This is true particularly for effects on streams and their dependent species. Fire, even severe fire, may pose less risk than continuance of past management (Rieman et al., in press).

The current condition of some watersheds is such that there may be little tolerance for added fire disturbance until road effects have been reduced and watershed condition is improved. These conditions and risks suggest that fire management in the subbasin be integrated with efforts to:

- ❏ Restore watershed conditions to the state that natural and prescribed fire do not represent intolerable risks to streams and fish: VRUs 1, 4, and 6 especially.
- ❏ Delineate the areas where vegetation treatment is needed, their priority for scheduling, and the realistic treatment options (harvest or fire). Use the information in this assessment (including watershed sensitivity, area and resources themes, VRUs, soil hazard ratings, disturbance history and existing vegetation condition) to specifically identify areas where fire treatment is needed and appropriate.

Noxious Weeds

Because noxious weeds cross ERU and some VRU boundaries, recommendations are given here. They will require some careful coordination with road, harvest, and fire strategies , especially in VRUs 3, 4 and 12.

- ❏ When ground disturbing or habitat altering actions are proposed, assess the risk of introducing or spreading noxious weeds. For actions that have a moderate to high risk of spreading weeds, identify and implement control and/or prevention measures as part of the management prescription.
- ❏ Treat noxious weeds along transportation corridors that could act as a founder population for new infestations.
- ❏ Biological control agents should be released and managed in areas where the target weed can be tolerated and future spread is acceptable, or where control is not feasible.
- ❏ Monitor management activities within susceptible habitats for changes in exotic plant populations.
- ❏ Control and eliminate (where possible) all new invasive plants through aggressive and timely treatment.
- ❏ Limit the use of long-lived exotics plants in erosion control where the invasiveness of the species is unknown.
- ❏ Ensure that desirable vegetation is quickly reestablished after disturbances. Favor the use of native species where the native species can accomplish the site objectives and costs are not excessive.

- ❑ Where feasible and consistent with landscape objectives, maintain as much shade as possible on susceptible sites, and maintain the herbaceous layer in a healthy productive state.
- ❑ All seed purchased for use on National Forest lands within the subbasin, should be tested for noxious weeds, based on the "all-state noxious weeds list" compiled by the Idaho State Seed Laboratory, Boise Idaho.
- ❑ Maintain an inventory of all noxious weeds and selected exotic plants. Stand exams, botanical surveys, range analysis and other resource inventories should identify and record noxious weeds as part of the inventory process.

Summary of Data Gaps and Work to be Completed

- ❑ A map is needed that displays the scenic classes for the basin. In order to produce this map, the original VQO classifications identified in the Forest Plan project file will be digitized and mapped. Then a "crosswalk" will be developed to equate the VQO classifications with the more up to date scenic classes.
- ❑ A more complete social assessment is needed which better defines the varied life-styles, social organization and culture, attitudes/beliefs and values, and economic environment and needs of the people who live in close proximity to, and/or use the South Fork Clearwater Subbasin.
- ❑ A monitoring plan is needed to track the effects of management activities on basin conditions and to track the mix of management activities that are implemented, in relation to recommended management priorities and emphases outlined in this assessment.
- ❑ Complete a statistical analysis of the landscape classification (ALTA) used in this assessment to verify and refine its description of aquatic disturbance setting and stratification for describing stream channel occurrence and fish habitat potential.
- ❑ Complete a channel condition analysis, using primarily existing fine scale data, to determine the appropriate stratification of landscapes, valley bottoms, and channels settings to describe the reference and objective conditions for streams (refinement of DFCs and RMOs). This will need to draw on data beyond the South Fork Clearwater Subbasin.
- ❑ Develop a comprehensive monitoring approach to the aquatic resources in the subbasin to better understand conditions and trends. This would entail a refinement of the existing Nez Perce Forest Plan monitoring plan (Section V-4 and Appendix O).
- ❑ Complete a baseline inventory of the physical and biological elements of the mainstem South Fork Clearwater River. Following this inventory, develop a long-term condition monitoring strategy for the mainstem river, integrated into the above subbasin monitoring approach.
- ❑ Working with other agencies and governments, continue to assess fish species distribution and abundance with respect to landscape setting and disturbance indices, to better understand the relationships between these elements.
- ❑ Develop and implement and aquatic restoration strategy for the subbasin that is efficient and effective. This strategy would address aquatic species conservation and recovery needs, water quality limited streams, Forest Plan objectives, and other applicable legal, social, environmental, and economic considerations.
- ❑ Johns Creek and the mainstem South Fork Clearwater River were identified in the Nez Perce Forest Plan as eligible for inclusion in the Wild and Scenic Rivers System: Johns Creek as wild and the mainstem South Form as recreation classification. A suitability study for both streams will be completed at a later date.
- ❑ Given the anticipated increases in use, a recreation master plan should be developed for the subbasin. It is recommended that such planning should concentrate first on the uses and

activities in the South Fork Canyon ELU, where much of the recreation use is currently concentrated, especially during the summer.

- Work cooperatively with IDF&G to determine the extent of hybridization within the westslope and bull trout populations in the subbasin, and develop a strategy to reduce this threat to these species.

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APPENDICES

Appendix A - Glossary

adfluvial: fish that spawn in tributary streams where the young rear from 1-4 years before migrating to a lake system, where they grow to maturity.

adjunct: watersheds with a moderate-low habitat potential for the species. Currently the population is depressed or weak and the habitat has been degraded.

adjunct habitat: watersheds with a moderate-low habitat potential for the species. Currently the habitat condition is good, while the population is depressed or weak.

adjunct population: watersheds with a moderate-low habitat potential for the species. Currently the population is strong, while the habitat has been degraded.

adjunct secure: Watersheds with a moderate-low habitat potential for the species. Currently the habitat condition is high, and the population is strong.

aggradational: river valley or streambed whose level is rising because it is depositing streambed material or debris.

Aleutian lows: low pressure systems associated with the Gulf of Alaska that typically bring fall, winter, and early spring storms to the Pacific Northwest.

alevins: a newly-hatched salmon or trout prior to absorption of the yolk sac.

allopatric: species, taxa or life-history forms occuring in separate or disjunct geographic areas.

ammocoetes: larval stage of lampreys, usually lasting four to seven years.

anadromous: fishes which spawn in fresh water, but spend a significant portion of their life on the ocean.

arterial road: a froest road that provides service to large land areas and usually connects with other arterial roads or public highways.

bankfull stage: the stream flow level at which flooding occurs; generally considered to have a 1 to 2 year return interval.

channel types: stream channel classification system based on observable characteristics; in this document based on Rosgen (1996).

collector road: a forest road that serves smaller land areas than an arterial road and usually connects forest arterial roads to local forest roads or terminal facilities**.**

connected: populations between which both upstream and downstream movements of all life stages of individuals is possible and can occur.

critical contributing - high quality: watersheds that do not contain suitable habitat (or are naturally barriered) and contribute hydrologically to downstream habitat for the species, where the habitat condition is good.

critical contributing - degraded: watersheds that do not contain suitable habitat (or are naturally barriered) and contribute hydrologically to downstream habitat for the species, where the habitat condition has been degraded.

dendritic: a stream drainage pattern found in areas of relatively uniform geologic structure and characterized by a branching, tree-like form.

diurnal winds: winds that blow up slope and up canyon during the day and down slope and down canyon after sunset.

ecologically significant unit (ESU): a population of fish that (1) is substantially reproductively isolated from other populations and (2) represents an important component in the evolutionary legacy of the species.

episodic disturbance: disturbances (like most fire or flood) that occur patchily in time and space.

escapement: adult fish which return to spawn.

extirpated: eradicated or abolished from an area.

fire frequency intervals: Fire frequency intervals were assigned based on habitat type group and landform setting. For example, habitat type group 3 (mostly grand fir/twinflower and grand fir/beargrass) was assigned to fire interval B in VRU 3 and to fire interval C in VRU 6. The frequency ranges are the same as used in the Interior Columbia River Basin assessment. The assignment of different habitat type groups to a severity and frequency class may differ from the ICRB Science Assessment in that local data were used.

A	5-25 years: Very frequent
B	26-75 years: Frequent
C	76-150 years: Infrequent
D	151-300 years: Very infrequent
E	>300 years: Extremely infrequent
0	Rock and water with no logical fire frequency

fluvial: fish that spawn in tributary streams where the young rear from 1-4 years before migrating to a river system, where they grow to maturity.

fragmentation: the breaking up of a larger population of fish, wildlife, or plant communities of a particular structure, into smaller disconnected subpopulations.

fry: first-year fish.

general winds: large scale winds caused by high and low pressure system, but generally influenced and modified in the lower atmosphere by terrain features.

guild: an association of similar species with traits related to a particular ecological niche.

habitat stronghold: refugia watersheds are those that contain high quality habitat with depressed or weak populations. The habitat in these areas has a high-very high potential to support the species. The population level in these areas is not considered to be a function of habitat, but other factors.

historic stronghold: watersheds with a high-very high habitat potential where the fish populations are weak and the habitat has been degraded.

hydrography: the graphical representation of streamflow through time.

i**mpact zones:** areas designated under the Clean Air Act as being below air quality standards.

inversion: atmospheric condition where normal properties of air layers are reversed (warm air traps cooler air underneath preventing it from rising).

juvenile rearing: habitat used by young fish for feeding and growth.

mesic: relatively moist.

metapopulation: a collection of localized populations that are generally distinct, yet are genetically interconnected through movement of individuals among populations.

migratory: describes the life history pattern in which fish spawn and spend their early rearing years in specific tributaries, but migrate to larger rivers, lakes or reservoirs as adults during their non-spawning time.

migratory habitat: habitat used during the migratory stage of a species.

nodal habitat: waters which provide migratory corridors, overwintering areas or other critical life history requirements.

nodal - high quality: subadult and adult rearing habitat (also referred to as migration/rearing habitat), where the habitat condition is good.

nodal - degraded: subadult and adult rearing habitat (often referred to as migration/rearing habitat), where the habitat condition has been degraded.

non-contributing: watersheds that do not contain suitable habitat (or are barriered) and do not contribute hydrologically to downstream habitat for the species.

Pacific highs: high pressure weather systems that typically bring warm, dry conditions to the Pacific Northwest during the summer.

population: an interbreeding group of fish that spawn in a particular river system (or part of it) and are reproductively isolated.

population resistance: ability of a population to resist adverse changes or extirpation.

population resilience: ability of a population to recover following a catastrophic event resulting in loss of individuals.

population stronghold: watersheds that contain strong fish populations with a high-very high habitat potential where the aquatic habitat that has been degraded.

prescription watershed: Nez Perce National Forest term for watershed numbered at the 6th code scale; they are the smallest watersheds that are currently permanently delineated.

press disturbance: disturbance (like sediment from roads ro channel alteration from mining or grazing) that alters the long term resilience of an ecosystem. Those we describe in this assessment are generally chronic, often widespread, and may exceed the capacity for recovery without assistance.

pulse disturbance: disturbance like most fires, floods, and some droughts that are within the range of natural disturbances to which an ecosystem is adapted, are temporary in time and often patchy in space, and natural recovery is usually possible without assistance.

refound/refounding: colonization by one or more individuals of an area where a subpopulation has been extirpated.

resident: fish that spend their entire life cycle usually in tributary or small headwater streams in which they were hatched.

ROS (recreation opportunity spectrum) Classes: a framework for stratifying and defining classes of outdoor recreation environment, activities, and experience opportunities. The settings, activities, and opportunities for obtaining experiences have been arranged along a continuum or spectrum divided into seven classes: **primitive, roaded modified, roaded natural, rural, semiprimitive motorized, semi-primitive non-motorized, and urban.**

subadult/adult rearing: habitat used by yound and adult fish for feeding and growth.

stronghold: Stronghold watersheds are those that contain both high quality (good condition) habitat and strong fish populations. The habitat in these areas has high-very high habitat potential to support the species.

substrate: organic or inorganic materials composing a stream or lake bottom; usually considered up to bankfull stage.

sympatric: distinct species, taxa or life-history forms occupying the same or overlapping geographic areas without interbreeding.

transitory range: areas suitable for grazing after a disturbance removes or reduces forest canopy. Transitory range is available only until regrowth of the forest occurs.

tributary: stream or river flowing into a lake or larger stream or river.

vagrants: species with wandering and nomadic lifestyles.

xeric: relatively dry

Appendix B - Acronym Definitions

ALTA - Aquatic Landtype Association

ATV - All Terrain Vehicle

BLM - Bureau of Land Management

C - Centegrade

CEDA - Clearwater Economic Development Association

CRB - Columbia River Basin

dbh - Diameter (tree) at Breast Height

EAWS - Ecosystem Analysis at the Watershed Scale

ECA - Equivalent Clearcut Acres

EHE - Elk Habitat Effectiveness

EHU - Elk Habitat Unit

EIS - Environmental Impact Statement

ERU - Ecological Reporting Unit

ESA - Endangered Species Act

ESU - Ecologically Significant Unit

FS - Forest Service

FWS - United States Fish and Wildlife Service

GIS - Geographic Information System

HUC - hydrologic unit code

HTG - Habitat Type Group

ICRB - Interior Columbia River Basin

IDF&G - Idaho Department of Fish and Game

LTA - landtype associations

MMBF - million board feet

NEPA - National Environmental Policy Act

NEZSED - Nez Perce National Forest sediment model

NF - National Forest

NIOG - North Idaho Old Growth

NMFS - National Marine Fisheries Service

NWPPC - Northwest Power Planning Council

ORV - Off-Road Vehicle

R1EDIT - USDA Forest Service Region 1 timber inventory (stand exam) storage and reporting system.

RAP - Restore Aquatic Processes

Appendices

RMS - Roads Management System (Region 1 standard roads database)

RNA - Research Natural Area

ROS - Recreation Opportunity Spectrum

SBW - Selway-Bitterroot Wilderness

SF - South Fork

SMS - Scenery Management System

TMDL - Total Maximum Daily Load

UCRB - Upper Columbia River Basin

USDA - United States Department of Agriculture

USDI - United States Department of Interior

VMS - Visual Management System

VRU - Vegetative Reporting Unit

WAG - Watershed Advisory Group

WQLS - Water Quality Limited Streams

Appendix C - Land and Stream Classifications

Vegetation Response Units (VRUs)

Vegetation Response Units **(VRUs)** are broad ecological land units that display unique patterns of habitat type groups (potential vegetation) and terrain. VRUs have similar patterns of disturbance and successional processes. Patterns of plant community composition, age class structure, and patch size will tend to fall within certain ranges for each VRU. VRUs were used in this assessment to estimate resource capabilities, ecological integrity, and responses to natural and human caused disturbances. The components used to build the VRU classification system are habitat type groups (potential vegetation), landform, and presettlement disturbance processes (like fire regimes). They are more basically a product of geology, landform, climate, and soil. VRUs are shown in Map 5.

VRU 1: Convex slopes, subalpine fir - This VRU is common in the South Fork at mid and upper elevations. Grand fir and subalpine fir habitat types are dominant. Lodgepole pine was historically dominant in many settings. Engelmann spruce, western larch, Douglas-fir, and whitebark pine were less common. Large infrequent (75 to 150 years or more) severe fires were typical of most settings. Historically, about 700 acres burned per year. About 60-80 percent of stands originated from stand replacing fire, and 20-40 percent from mixed severity fire. Moist lower slopes were most prone to mixed fire. Lodgepole, western larch and Douglas-fir sometimes survived one or more fires to form a scattered overstory.

VRU 2: Glaciated slopes, subalpine fir - This VRU is common in the South Fork at upper elevations. Subalpine fir and whitebark pine habitat types are dominant. Lodgepole pine, Engelmann spruce, and subalpine fir were historically dominant on sideslopes. Whitebark pine was important on ridges. Historically about 400 acres burned per year. Midslopes tended to experience stand replacing fire at infrequent intervals (75 to 150 years). Open ridges or moist valley bottoms were more prone to mixed severity fire.

VRU 3: Breaklands, grand fir and Douglas-fir - This VRU is common at lower to mid elevations in canyons. On south aspects, dry Douglas-fir habitat types are dominant. Open stands of large Douglas-fir and ponderosa pine were historically common. Low and mixed severity fire at very frequent intervals (5 to 25 years) occurred on south aspects. Here, 60-90 percent of stands showed evidence of survival through one to many fires. Ponderosa pine old growth occupied about 40 to 60 percent of these warm dry sites.

On north aspects, grand fir habitat types are dominant. Grand fir and Douglas-fir were common cover types, with ponderosa pine and western larch and sometimes Engelmann spruce or lodgepole pine. Pacific yew occurred on lower slopes. Mixed severity fire at frequent intervals (25 to 75 years) was common on north aspects. About 30-60 percent of stands retained 10 or more trees per acre through at least one fire. Twenty to 30 percent of stands included at least 10 trees per acre older than 150 years. Ponderosa pine, western larch, Douglas-fir, and grand fir formed the old overstory.

VRU 4: Rolling hills, grand fir - This VRU is common in the South Fork at low and mid elevations. Grand fir habitat types are dominant. Grand fir, Douglas-fir, ponderosa pine, and western larch were historically dominant. Lodgepole pine and Engelmann spruce were less common. Mixed and stand replacing fire occurred at frequent to infrequent intervals (25 to more than 150 years). About 50-60 percent of stands originated from stand replacing fire and 40-50 percent from mixed and low severity fire. Ponderosa pine, western larch, Douglas-fir, and grand fir often survived mixed severity fires to form a scattered overstory of old large trees.

VRU 5: Moraines, subalpine fir and grand fir - This VRU is rare in the South Fork, at mid to upper elevations. Grand fir and subalpine fir habitat types are dominant. Lodgepole pine and Engelmann spruce are common seral species. Grand fir, Douglas-fir, subalpine fir, and western larch are minor components. Mixed and stand replacing fire occurred at infrequent intervals (75 to more than 150 years). About 35 percent of stands originated from stand replacing fire and 65 percent had mixed or low severity Historically extensive snag patches are no longer being created as a result of fire suppression.

VRU 6: Cold basins, grand fir and subalpine fir - This VRU is very common in the subbasin, at mid elevations. Grand fir and subalpine fir habitat types are dominant. Lodgepole pine was the dominant seral species. Western larch, Douglas-fir, and Engelmann spruce were important. Grand fir was important on mesic sites. Whitebark pine was historically occasional. Five to 15 percent of stands included at least 10 trees per acre older than 150 years. Medium to large stand replacing fires occurred at infrequent intervals (75 to 150 years). About 60-90 percent of stands originated from stand replacing fire and 10-40 percent had mixed severity fire.

VRU 7: Moist uplands, grand fir and Pacific yew - This VRU is common in the subbasin, at mid elevations, but quite rare elsewhere in northern Idaho. Mesic grand fir habitat types are dominant, and Pacific yew phases are common. Grand fir, Douglas-fir, and Pacific yew were the dominant species. Western larch, Engelmann spruce and lodgepole pine are less common. Usually small to medium fires of mixed severity occurred at infrequent intervals (75 to 150 years). Large stand replacing fires occurred more infrequently. About 60 percent of stands originated from mixed severity fire and about 40 percent from stand replacing fire.

VRU 8: Breaklands, cedar and grand fir - This VRU is rare in the subbasin and common northward, at low and mid elevations. Moist grand fir and cedar habitat types are dominant. Grand fir and Douglas-fir were the dominant species. Western larch, western redcedar, western white pine, Engelmann spruce, and Pacific yew were less common. Ponderosa pine and lodgepole pine were minor. Small to medium fires occurred at frequent intervals (25 to 75 years) and large stand replacing fires at infrequent intervals. About 40-50 percent of stands originated from mixed severity fire, and 50-60 percent from stand replacing fire.

VRU 9: Glaciated ridges, subalpine fir and whitebark pine - This VRU is rare in the subbasin, at highest elevations, but more common to the south and east. Cold subalpine fir and whitebark pine habitat types are dominant. This was the major stronghold of whitebark pine. Subalpine fir, Engelmann spruce, and lodgepole pine were common. Mixed severity fire occurred at frequent to infrequent (25 to more than 150 years) out 40-60 percent of stands originated from mixed severity fire and 40-60 percent from stand replacing fire.

VRU 10: Uplands, alder, grand fir and subalpine fir habitat types - This VRU is common in the South Fork, but rare to the south. It is also called the grand fir mosaic. Mesic grand fir, subalpine fir, and alder habitat types are dominant. Grand fir, Engelmann spruce, subalpine fir, and Sitka alder were historically important cover types. Douglas-fir, western larch, lodgepole pine, and Pacific yew were common on ridges. Small fires occurred frequently, but mixed severity infrequent fire (at intervals of 75 to more than 150 years) was typical, with stand replacement usually confined to ridges. About 40-60 percent of stands originated from mixed severity fire and 40-60 percent from stand replacing fire. Small blocks of (5-50 acres) fire killed medium and large trees were common at any one time in 10,000 acres of this VRU.

VRU 12: Stream breaklands, bunchgrass and shrublands - This VRU is rare on National Forest lands in the subbasin, but is common in the lower canyon on private lands. Bluebunch and Idaho fescue habitat types are dominant. Shrubland habitat types are common. Bluebunch wheatgrass and Idaho fescue were historically important. Shrublands occupied draws or lower slopes. Very frequent (5 to 25 years) low severity fire maintained open grasslands and rejuvenated shrublands.

VRU 16: Plateaus, bunchgrass and shrubland habitat types - This VRU occurs only on non-National Forest lands. Bluebunch and Idaho fescue and shrubland habitat types are common. Bluebunch wheatgrass and Idaho fescue were historically important. Shrublands occupied draws, lower slopes, and north aspects. Very frequent (5 to 25 years) low severity fire maintained open grasslands and rejuvenated shrublands.

VRU 17: Rolling hills, cedar and grand fir - This VRU is rare in the South Fork. Mesic grand fir and western redcedar habitat types are dominant. Grand fir and Douglas-fir were historically important cover types. Cedar, western white pine, western larch, Engelmann spruce, and ponderosa pine were less common. Small fires occurred frequently, but mixed severity infrequent fire (75 to more than 150 years) was typical. About 40-60 percent of stands originated from mixed severity fire and 40-60 percent from stand replacing fire.

Habitat Type Groups (HTGs)

1...........Warm and dry ponderosa pine and Douglas-fir

2...........Moderately warm and dry Douglas-fir and grand fir

3...........Moderately cool, moderately dry grand fir

4...........Moderately warm and moist grand fir

5...........Moderately cool and moist western red cedar

6...........Moderately cool and wet western red cedar

7...........Cool and moist subalpine fir

8...........Cool and wet subalpine fir

9...........Cool and moderately dry subalpine fir

10.........Cold and moderately dry subalpine fir

11.........Cold whitebark pine-subalpine fir and alpine larch-subalpine fir

15.........Grassland steppe

30.........Shrubland steppe

50.........Hardwoods

60.........Mountain bottomlands

80.........Alpine Meadows and scrub

0...........Rock

98.........Water

Aquatic Landtype Associations (ALTAs)

ALTAs display historic aquatic settings that consider both terrestrial disturbance regimes (fire, erosion) and aquatic disturbance regimes (runoff character, flood timing and how channels process peak flows and sediment inputs). They may have considerable overlap with VRUs and LTAs. ALTAs consider not only landform, geology, and vegetation, but weigh elevation fairly heavily because of the role of ground water temperature and base flows in limiting aquatic habitats, and the relative significance of rain on snow at lower elevations, and sustained runoff at higher elevations. ALTAs are built looking at not only the component landforms, but the included channel systems, in particular, their size and gradient.

ALTA 1 Broad convex ridges, high elevation, granitic
These are above about 5500 feet elevation, dominantly low relief, with moderate and low gradient channels, mostly low order. These areas historically provided important spawning and rearing habitat for resident and some anadromous species. Snowpack is high, snowmelt is sustained, and groundwater is cold. Base flows are sustained. Fire disturbance is long interval, large size (few thousand to 50,000 acres), often lethal. These areas were important refugia between disturbances at lower elevations.

ALTA 2 Glaciated slopes, high elevation, granitic
These are above about 5500 feet, dominantly high relief, with high and moderate gradient channels, mostly low order. These historically may have provided some habitat for resident fish in more moderate gradient reaches. Bedrock barriers and falls may occur and limit accessibility. Snowpack is high, snowmelt is usually sustained, groundwater is cold. Groundwater upwelling in tills is likely common. Base flows are sustained. Fire disturbance is long interval, moderate size (few hundred to 10,000 acres), and mixed or lethal.

ALTA 3 Breaklands, low elevation, granitics
These are below about 5000 feet, high relief and steep slopes, with high and moderate gradient channels except for large order streams. Channels are usually highly confined in v-shaped valleys. Larger order streams historically provided important spawning and overwintering habitat. Snowpack is low, rain on snow events can occur, and snowmelt is often rapid. Peak flows may be flashy. Fire disturbance is short and moderate interval, moderate size (several hundred to several thousand acres), and low severity or mixed. Mass wasting and debris torrents are major agents of channel change.

ALTA 4 Low relief hills, low elevation, granitic
These are below about 5500 feet elevation, dominantly low relief, with moderate and low gradient channels. Larger order channels (3rd-4th) tend to be low gradient in moderately to poorly to moderately confined valleys. These historically provided spawning and rearing habitat for resident and some anadromous species. Snowpack is moderate, rain on snow events can occur, but lower gradient channels moderate peak flows. Fire disturbance is short and moderate interval, moderate size (several hundred to 10,0000 acres), and low severity or mixed. Cold groundwater upwelling is infrequent.

ALTA 5 Glacial valley bottoms, low gradient, granitic
These are above about 5500 feet, low relief valleys with moderate and low channel gradients, and often boulder substrates. Channels are usually poorly to moderately confined in U-shaped valleys. Bedrock barriers or falls may occur and limit access to upstream reaches. Where accessible, these historically provided important refugia for resident and perhaps some anadromous species. Snowpack is high, snowmelt is usually sustained, and groundwater is cold. Groundwater upwelling in till is likely common. Base flows are sustained. Fire disturbance is long to very long interval, moderate size (few hundred to 10,000 acres), and mixed severity.

ALTA 6 Low relief hills, mid elevation, granitic
These are at mid elevations in montane basins, 4000-6000 feet, dominantly low relief, with moderate and low channel gradients. Larger order channels (3rd-4th) tend to be low gradient, with gravel and cobble substrates and low confinement. These historically provided important spawning and rearing habitat for resident and anadromous species. Snowpack is moderate, but rain on snow events are unlikely. Runoff and base flows are sustained. Groundwater is usually cold, and groundwater upwelling in alluvial valleys may occur. Fire disturbance is moderate to long interval, often lethal, and moderate in size (several hundred to several thousand acres).

ALTA 7 Breaklands, low elevation, basalt
These are below about 5000 feet, high relief and steep slopes, with high and moderate gradient channels except for large order streams (6th-7th order). These historically provided important overwintering habitat and some spawning habitat for anadromous species. Channels are usually highly confined in narrow valleys. Snowpack is low, rain on snow events can occur, snowmelt is often rapid. Peak flows may be flashy. Fire disturbance is short and moderate interval, moderate size (several hundred to several thousand acres), and low severity or mixed. Debris torrents are major agents of channel change. Erosion hazard is lower than ALTA 3, and channels may be more resistant to change.

ALTA 8 Breaklands, moist, metamorphics
These are below about 5000 feet, with high and moderate channel gradients except for larger order streams (6th-7th order). Streams are usually highly confined in narrow valleys. Large order streams historically provided important overwintering habitat and spawning habitat for anadromous species. Snowpack is moderate, rain on snow events can occur, and snowmelt is often rapid. Peak flows may be flashy. Fire disturbance is moderate to long interval, moderate size (several hundred to several thousand acres) and mixed severity. Mass wasting and debris torrents are major agents of channel change.

ALTA 9 Low relief hills, mid elevation, highly weathered granitics
These are above about 4000 feet and below about 6400 feet, low relief, with moderate and low gradient channels. Streams are often poorly confined in alluvial valleys. Channels are unresistant and unresilient. They historically provided important spawning and rearing habitat. Snowpack is moderate, rain on snow events seldom occur, and runoff is sustained. Fire disturbance is moderate to long interval, moderate size (several hundred to tens of thousands of acres, and lethal. Soil substrata are sandy and highly erodible, and channels are highly subject to deposition.

ALTA 10 Alluvial valleys, low elevation, large order streams
These are below about 3000 feet, low relief flood plains and terraces along large rivers. Rivers are usually moderately confined. These areas historically provided important overwintering habitat and some spawning and rearing habitat for anadromous species. Snowpack is locally low, rain on snow events locally unlikely, and runoff is moderated by the diversity of environments in the basin. Regional winter storms and spring runoff can result in widespread flooding. Side channels and sloughs were historically common. Upstream fire disturbance is moderated by the size of the basin. Local fire disturbance is high frequency, low to mixed severity, and moderate size (hundreds to tens of thousands of acres).

ALTA 15 Plateaus, mid elevation, basalt
These are between about 4000 and 6000 feet elevation, low relief, with moderate and low gradient channels. Channels are usually fairly resistant and resilient. They historically provided habitat primarily for resident fish. Snowpack is moderate, rain on snow events unlikely, and runoff is sustained. Fire disturbance is moderate interval, moderate size (several hundreds to 10,000 acres), and mixed severity.

ALTA 16 Plateaus, low elevation, basalt
These are below about 4000 feet elevation, low relief, with low gradient channels. Channels are in poorly confined trough shaped valley bottoms. They become highly entrenched with heavy disturbance. Channels are usually fairly resistant and resilient. They historically provided important spawning and rearing habitat. Snowpack is low, rain on snow events can occur, and runoff in cropland is flashy. Fire disturbance is frequent, moderate size (several hundreds to several thousand acres) and low severity.

ALTA 17 Low relief hills, moist, metamorphics
These are between about 4000 and 5500 feet elevation, with moderate and high gradient channels. Channels are low order, in moderate to highly confined v-shaped or trough-shaped valley bottoms. They are moderately resistant and resilient. These areas historically provided limited habitat. Snowpack is moderate, rain on snow events can occur, but runoff is not often flashy. Fire disturbance is moderate to low frequency, mixed severity and moderate size (hundreds to 10,000 acres.

ALTA 18 Alluvial valleys, mid and upper elevation
These are above about 3000 feet, with low gradient channels, poorly confined in trough-shaped valley bottoms or flat valleys in canyons. Low gradient channels are usually not resistant or resilient. These areas historically provided important spawning and rearing habitat. Snowpack is moderate to high, rain on snow events seldom occur, and runoff is sustained from adjacent uplands. Groundwater upwelling may be common. Fire disturbance is moderate to low frequency, low to mixed severity, and these valleys usually only burn as part of extreme fire conditions in the uplands.

ALTA 21 Mountain uplands, granitic
These are above about 5000 feet, with moderate and high gradient channels, usually well confined in v-shaped or trough-shaped valley bottoms. Channels are usually resistant and resilient. These are cold water source areas, but low order channels often are too steep or too small for high fish habitat potential. 3rd order channels or higher may have good habitat potential for cold water dependent resident species. Snowpack is moderate to high, rain on snow events seldom occur, and runoff is usually sustained. Fire disturbance is moderate to low frequency, small to moderate in size (hundreds to a few thousand acres) and mixed severity.

Hydrologic Zones

By combining the concepts of runoff regime and channel process, four basic hydrologic zones can be described within the South Fork Clearwater Subbasin. These are as follows:

Zone 1 - High Elevation Mountains - This includes those areas above about 6,000 feet, often on glaciated landforms. It includes ALTAs 1, 2, and 5. Annual precipitation is typically 40 to 60 inches. High snow accumulations and relatively late, prolonged snowmelt are common. Stream channels are highly variable within this zone ranging from very steep, confined headwater streams to relatively flat channels located in glaciated valleys. Channels are typically first to third order. This zone is best exemplified by upper Johns and Tenmile Creeks.

Zone 2 - Mid Elevation Rolling Uplands - This zone is typically between 4,000 and 6,000 feet elevation with relatively low relief, rolling hills. It includes ALTAs 4, 6, 9, 18, and 21. Annual precipitation is typically 30 to 40 inches. There is typically a moderate annual snowpack accumulation, followed by May snowmelt as the dominate peak flow process. Stream channels range in size from first to fifth order and can range from relatively steep, confined channels in headwaters to low gradient, unconfined streams in alluvial valley bottoms. This zone covers the largest portion of the South Fork Subbasin and is best exemplified by the watersheds of Red River, American River, Newsome Creek, and Crooked River.

Zone 3 - Low Elevation Breaklands - This zone is typically less than 4,000 feet in elevation and has steep sideslopes. It includes ALTAs 3, 7, and 8. Precipitation is typically 20 to 30 inches. Snowpacks are low to intermittent. The runoff regime is complex, with a mix of snowmelt, rain-on-snow, and rain resulting in peak runoff events, typically in early spring, but potentially anytime during winter, spring, or summer. Streams range from first order up to the mainstem South Fork. Streams have a wide range of gradients, but are generally well-confined with steep valley walls. Debris torrents are relatively common in first through third order streams. This zone is found all along the South Fork Canyon.

Zone 4 - Low Elevation Plateaus - This zone is typically less than 4,000 feet in elevation and has relatively flat sideslopes. It includes ALTAs 15 and 16. Precipitation is typically 20 to 30 inches. Snowpacks are low to intermittent. The runoff regime is mixed, with snowmelt, rain-on-snow, and rain resulting in peak flows at various times. Early spring peaks are most likely, but mid-winter peaks are not uncommon. Streams range from first through fourth order and are relatively flat and unconfined. This zone is best exemplified by the Camas Prairie.

Stream Channel Types

Channel types are used to classify streams based on observable characteristics. The classification system used in this assessment was developed by Rosgen (1994). It has the following objectives:

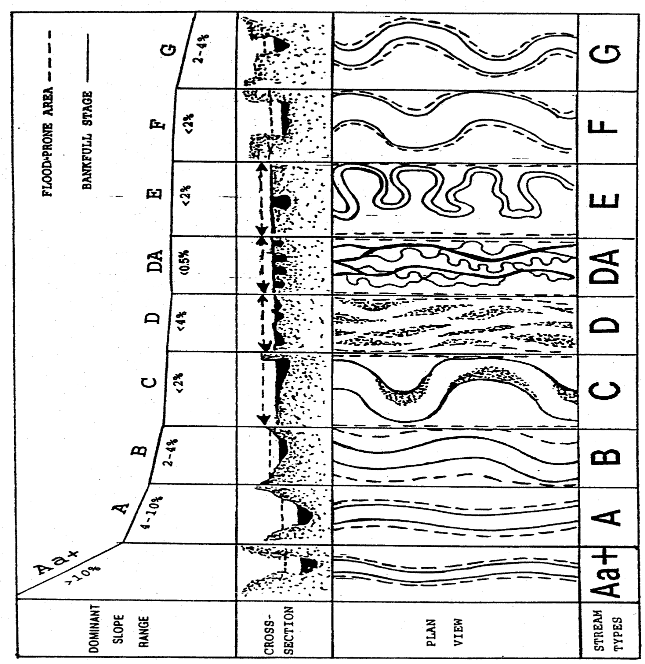
1) Predict a river's behavior from its appearance;
2) Develope hydraulic and sediment relations for a given channel type and state;
3) Provide a means to extrapolate site-specific data from a stream reach to streams of similar character; and
4) Provide a consistent and reproducible frame of reference for communication for those working with rivers.

The morphology of channels is governed by the laws of physics and is the result of the influence of stream variables, including width, depth, velocity, discharge, slope, roughness, sediment load, and sediment yield. Changes in these variables often result in channel adjustments and a change in channel pattern. This process creates measurable variables that can be used as stream classification criteria. In Rosgen's system, the major classification criteria are as follows:

1) Thread (single versus multiple channels);
2) Entrenchment (access to floodplains, measured vertically in the channel);
3) Sinuosity (stream length relative to valley length);
4) Width to depth ratio (measured at bankfull stage);
5) Stream gradient (measured in percent); and
6) Substrate size (median of inorganic bed materials).

The diagram below illustrates some of the major criteria used to delineate stream channel types at the broad geomorphic characterization level. It was originally published in Rosgen (1994).

Figure C.1



Longitudinal, cross-sectional and plan views of major stream types.

Ecological Reporting Units (ERUs)

The South Fork was divided into 13 geographic areas or Ecological Reporting Units (ERUs) which help describe where terrestrial and aquatic environments occur, and how their capability and condition are related. Each also provides a sense of place. ERUs are watersheds or aggregates of watersheds. ERUs help locate the discussion of ecological processes, effects of past management activities, present social and biological trends, and they provide a focus for future management strategies to achieve sustainable landscape conditions.

For discussion of management themes in Chapter 4, some ERUs have been subdivided to account for biophysical differences within an ERU (differences in VRU or ALTA). Portions of the watershed (often the lower elevation zone as distinct from the upper elevation zone) make sense for consideration of terrestrial condition and process or aquatic capability (see map 7). The South Fork Subbasin includes the following ERUs: Camas Prairie, South Fork Canyon, Meadow Creek, Cougar-Peasley Creek, Silver Creek, Newsome-Leggett Creeks, American River, Red River, Crooked River, Tenmile Creek, Wing-Twentymile Creek, Johns Creek, and Mill Creek (See Map 7). Descriptions of each ERU in the subbasin are contained in Chapters 3 and 4. Table C-1 below summarizes characteristics each ERU subdivisions.

Table C-1 - Summary of ERUs

ERU Subdivision	VRU	Terrestrial Disturbance Regime	Key Vegetation Elements	ALTA	Aquatic Disturbance regimes	Key Stream Elements
Camas Prairie	3/16	frequent, low to mixed severity fire	grassland steppe, ponderosa pine	7/16	rain, rain-on-snow floods, low flows, mass erosion and warm water	mixed confinement mainstem & tribs; low-mod gradient in small to medium tribs
Lower South Fork Canyon	3/4	frequent, low to mixed severity fire	ponderosa pine/open and two story stands	3/4	rain, rain-on-snow floods and mass erosion	confined mainstem; confined, steep, small tribs
Upper South Fork Canyon	6	infrequent large and lethal fires	large lodgepole and mixed conifer	3/6	rain-on-snow, snowmelt floods	confined mainstem; confined, steep, small tribs.
Lower Meadow Creek	3/4	frequent, low to mixed severity fire	ponderosa pine/open and two story stands	3/4	rain, rain-on-snow floods and mass erosion	mixed confinement and gradient; small to medium size
Upper Meadow Creek	7/10	infrequent mixed severity fire	grand fir old growth and alder glades	21	rain-on-snow, snowmelt floods	confined, moderate gradient, small streams
Lower Cougar-Peasley Creeks	3/4	frequent, low to mixed severity fire	ponderosa pine/open and two story stands	3/4	rain, rain-on-snow floods and mass erosion	confined, moderate to steep gradient, small streams
Upper Cougar-Peasley Creeks	7/10	infrequent mixed severity fire	grand fir old growth and alder glades	21	snowmelt floods	confined, steep gradient, small streams
ERU	**VRU**	**Terrestrial**	**Key**	**ALTA**	**Aquatic**	**Key Stream**

Subdivision		Disturbance Regime	Vegetation Elements		Disturbance Regimes	Elements
Lower Silver Creek	3/4	frequent, low to mixed severity fire	ponderosa pine/open and two story stands	3/4	rain-on-snow, snowmelt floods and mass erosion	confined, steep gradient, small streams
Upper Silver Creek	2/7/10	infrequent mixed severity fire	grand fir old growth and alder glades; spruce-fir	2/21	snowmelt floods	confined, steep gradient, small streams
Lower Newsome Creek	3/6	frequent to infrequent mixed severity fire	lodgepole and mixed conifer	3/6/18	rain-on-snow and snowmelt floods	mixed confinement, low to medium gradient, small to medium sized streams
Upper Newsome Creek	7/10	infrequent mixed severity fire	grand fir old growth and alder glades	21	snowmelt floods	confined, moderate to steep gradient, small streams
Lower American River	6	infrequent large and lethal fires	lodgepole and mixed conifer	6/18	rain-on-snow and snowmelt floods	mixed confinement, low to moderate gradient, small to medium sized streams
Upper American River	7/10	infrequent mixed severity fire	grand fir old growth and alder glades	6/18	snowmelt floods	confined, medium to steep gradient, small streams
Lower Red River	6	infrequent large and lethal fires	lodgepole and mixed conifer	3/6/18/21	rain-on-snow and snowmelt floods	mixed confinement, low to medium gradient, small to medium sized streams
Middle Red River	4	frequent, low to mixed severity fire	ponderosa pine/open and two story stands	4/18	rain-on-snow and snowmelt floods	mixed confinement, low to medium gradient, small to medium sized streams
Upper Red River	1	infrequent large and lethal fires	lodgepole and spruce-fir	1/18	snowmelt floods	confined, moderate to steep gradient, small streams
Lower Crooked River	3/6/7	infrequent mixed and lethal fire	lodgepole and mixed conifer	3/6	rain-on-snow and snowmelt floods	mixed confinement, mixed gradient, small to medium sized streams
Upper Crooked River	1	infrequent large and lethal fires	lodgepole and spruce-fir	2/21	snowmelt floods	confined, steep gradient, small streams
Lower Tenmile Creek	3/6	infrequent mixed and lethal fire	lodgepole and mixed conifer	3/6/21	rain-on-snow and snowmelt floods	confined, moderate to steep gradient, small to medium sized streams

Appendices

ERU Subdivision	VRU	Terrestrial Disturbance Regime	Key Vegetation Elements	ALTA	Aquatic Disturbance Regimes	Key Stream Elements
Upper Tenmile Creek	1/2/9	infrequent lethal and mixed fire	lodgepole, spruce-fir and whitebark pine	1/2/5	snowmelt floods	mixed confinement and gradient small streams
Lower, East Wing-20 Creeks	6	infrequent large and lethal fires	lodgepole and mixed conifer	6/21	snowmelt floods	mixed confinement and gradient small streams
Lower West Wing-20 Creeks	3/7	infrequent mixed and lethal fire	ponderosa pine and mixed conifer	6/21	rain-on-snow, snowmelt floods and mass erosion	confined, steep gradient, small streams
Upper Wing 20 Creeks	1	infrequent large and lethal fires	lodgepole and spruce-fir	1	snowmelt floods	confined, steep gradient, small streams
Lower Johns Creek	3/4/6	frequent, low to mixed severity fire	ponderosa pine and mixed conifer	3/4	rain, rain-on-snow, snowmelt floods and mass erosion	confined, moderate to steep gradient, small to medium sized streams
West Johns Creek	3/4	frequent low severity fire	ponderosa pine/open and two story stands	3/4	rain-on-snow, snowmelt floods and mass erosion	mixed confinement and gradient, small streams
Upper Johns Creek	1/2/9	infrequent lethal and mixed fire	lodgepole, spruce-fir and whitebark pine	1/2/5	snowmelt floods	mixed confinement and gradient, small streams
Lower Mill Creek	3/4	frequent, low to mixed severity fire	ponderosa pine/open and two story stands	3/4	rain, rain-on-snow, snowmelt floods and mass erosion	mixed confinement, moderate to steep gradient, small to medium sized streams
Upper Mill Creek	1/5	infrequent mixed and lethal fires	lodgepole and spruce-fir	1/6	snowmelt floods	confined, steep gradient small streams

Appendix D - Snags and Coarse Down Woody Material

These are interim recommendations recognizing that Forest Plan standards are inadequate or do not address the issue. A rigorous analysis is needed to develop well documented recommendations for local application. To date, this has not been done. These recommendations are adapted from the Payette National Forest (USDA, 1995), but they have been applied to harvest as well as burned areas. The number of recommended snags per acre are also shown on a per 10 acre basis to provide flexibility to cluster snags for logging safety and logistic considerations. Snags are dead trees. **Where dead trees are not present in a harvest area, live trees may be left in their place, in addition to the green trees left as recommended in Table D-4 for long term snag recruitment.**

Snag densities should meet the guidelines on each 10 acre area considered. These numbers are closer to lower limits of natural occurrence than upper. They may be exceeded. Distribution should consist of clumps and individual trees. Probably no more than 3-4 acres should be without a snag. The objective of snag distribution is diversity within and across 10 acre areas.

Riparian acres can contribute to the total snag requirements for a 10 acre area based on the proportion of riparian acres within the 10 acre area, and up to two times the amount of snags per acre shown in the tables below. Guidelines aim for an overall diversity of decay class and heights. Where snags of one size class are not available, other size classes may be substituted. Snags should reflect the natural condition. If the majority of trees are 30 inches or greater, then snags retained should be of comparable size. Recommended levels of snags to leave vary with severity of disturbance, as would snag levels occurring in natural disturbance regimes.

Table D-1 - Interim Recommended Snag Density: Low Fire Severity or Harvest Removing less than 30 Percent of Original Basal Area

Cover Type	Snags/Acre 10-14.9 in. dbh	Snags/Acre 15-19.9 in. dbh	Snags/Acre 20-23.9 in. dbh	Snags/Acre 24 in.+ dbh	Total Snags/Acre	Total Snags/ 10 Acres
Subalpine fir / Engelmann spruce	5.0	2.5	1.0	1.0	9.5	95
Mixed conifer						
Canopy <40%	.5	.2	.4	1.4	2.5	25
Canopy >40%	2.5	3.0	2.0	1.5	9.0	90
Lodgepole pine						
Canopy < 40%	3.5	1.0	all present	all present	4.5+	45+
Canopy > 40%	6.0	1.7	all present	all present	7.7+	77+
Ponderosa pine/Douglas-fir						
Canopy < 40%	.2	.2	.1	.7	1.2	12
Canopy > 40%	1.3	1.4	.8	1.3	4.8	48

Table D-2 - Interim Recommended Snag Density: Moderate Fire Severity, or Harvest Removing 30 to 70 Percent of Original Basal Area

Cover Type	Snags/Acre	Snags/Acre	Snags/Acre	Snags/Acre	Total	Total snags/

	10-14.9 in. dbh	15-19.9 in. dbh	20-23.9 in. dbh	24 in.+ dbh	Snags/Acre	10 Acres
Subalpine fir / Engelmann spruce	5.0	2.5	2.0	2.0	11.5	115
Mixed conifer						
Canopy <40%	.5	.2	.6	2.1	3.3	33
Canopy >40%	2.5	3.0	3.0	2.3	10.8	108
Lodgepole pine						
Canopy < 40%	3.5	1.0	all present	all present	4.5+	45+
Canopy > 40%	6.0	1.7	all present	all present	7.7+	77+
Ponderosa pine/Douglas-fir						
Canopy < 40%	.6	.4	.6	1.8	3.4	34
Canopy > 40%	1.3	1.4	1.2	2.0	5.9	59

Table D-3 - Interim Recommended Snag Density: High Fire Severity or Harvest Removing More than 70 Percent of Original Basal Area

Cover Type	Snags/Acre 10-14.9 in. dbh	Snags/Acre 15-19.9 in. dbh	Snags/Acre 20-23.9 in. dbh	Snags/Acre 24 inches+ dbh	Total Snags/Acre	Total snags/10 Acres
Subalpine fir / Engelmann spruce	5.0	2.5	3.0	3.0	13.5	135
Mixed conifer						
Canopy <40%	.3	.5	.6	1.8	3.2	32
Canopy >40%	2.5	4.0	4.0	3.0	13.5	135
Lodgepole pine						
Canopy < 40%	3.5	2.0	all present	all present	5.5+	55+
Canopy > 4%	6.0	2.0	all present	all present	8.0+	80+
Ponderosa pine/Douglas-fir						
Canopy < 40%	.9	.6	.9	2.7	5.1	51
Canopy > 40%	1.3	1.5	1.6	2.6	7.0	70

Green Tree Snag Replacement - These recommendations consider the work of Schommer et al. 1993, and Ritter and Davis, 1994, and the snag guidelines from the Payette National Forest (USDA Forest Service 1995). Current Nez Perce Forest Plan green tree replacement standards call for 4 trees per acre to be retained to provide large old trees to become snags in the future. Monitoring has shown these trees are likely to be lost to other causes before becoming available as snags. Causes of loss include windthrow, salvage, falling for safety concerns, or slash burning (Steve Blair, pers. com.).

As an interim recommendation, Table 4.4 below displays recommended green tree retention densities. **Where adequate snags are not present to meet the recommended snag densities in Tables D-1, D-2, and D-3, green trees will be left to meet the sum of the densities in Table D-4 below and the appropriate snag density table above.** For example, if no snags were present, in a mixed conifer stand with more than 40 percent canopy, and the harvest is stand replacement, total green tree retention would be 22.5 trees per acre (13.5 + 9). It is anticipated that some of these trees might be killed in post-harvest burning, and this is usually acceptable. Leave trees should represent the range of species and size classes most likely to survive natural fire disturbance, and should be located in the clustering patterns and locations most likely to have survived natural fires in the local setting (e.g. open ridges, wet areas, rocky areas).

Table D-4 - Interim Recommended Green Tree Snag Replacement Density: Minimum for All Harvest Prescriptions

Cover Type	Trees/Acre 10-14.9 in. dbh	Trees/Acre 15-19.9 in. dbh	Trees/Acre 20-23.9 in. dbh	Trees/Acre 24 in.+ dbh	Total Trees/Acre	Total Trees/ 10 Acres
Subalpine fir / Engelmann spruce	5.0	2.5	1.0	1.0	9.5	95
Mixed conifer						
Canopy <40%	.5	.2	.4	1.4	2.5	25
Canopy >40%	2.5	3.0	2.0	1.5	9.0	90
Lodgepole pine						
Canopy < 40%	3.5	1.0	all present	all present	4.5+	45+
Canopy > 40%	6.0	1.7	all present	all present	7.7+	77+
Ponderosa pine/Douglas-fir						
Canopy < 40%	.2	.2	.1	.7	1.2	12
Canopy > 40%	1.3	1.4	.8	1.3	4.8	48

Coarse Woody Debris Recommendations - The recommendations shown in Table D-5 are based on the work of Graham et al. 1994 and Harvey et al. 1987. They are adapted from guidelines for the Payette National forest (USDA Forest Service, 1995). These guidelines assume that the more severe a disturbance affecting existing soil wood reserves, the more important it becomes to supplement the soil wood supply. Therefore, the recommendations change not only with habitat type, but with severity of fire or harvest treatment.

Table D-5 - Interim Recommended Woody Debris Recommendations

Harvest or Fire Severity	Habitat Type Groups 1 and 2 Tons/Acre	Habitat Type Groups 3, 9, 10	Habitat Type Groups 4, 7, 8
Low: Low fire severity of harvest	5-10	10-15	15-20

leaving slash on-site, no dozer piling or hot broadcast burn			
Moderate: Moderate fire severity or harvest with moderate broadcast burn	10-15	15-20	20-25
High: High fire severity, or harvest yarding tops or hot broadcast burn, or dozer pile	15-20	20-25	25-30

Appendix E - Wildlife Survey Strategy

SOUTH FORK CLEARWATER SUB-BASIN WILDLIFE SURVEY STRATEGY

Survey techniques should be designed to determine species' presence/absence initiatlly during the early stages of future management, shifting to a survey objective of determining "relative index of abundance" after substantial amounts of restoration and other appropriate land treatments have been applied. Due to limited funds for all survey work, the following priorities and guidance is recommended:

HIGHEST PRIORITY SPECIES

1. **Flammulated owl** - Status: Forest Service sensitive; Ponderosa pine-dependent species; priority ERUs for surveys include: Western 3/4 of South Fork Canyon, lower end of Meadow Creek, Peasley-Cougar Creeks, Silver Creek, John's Creek, and Mill Creek ERUs.
2. **Black-backed woodpecker** - Status: Forest Service sensitive; early seral-dependent species; priority ERUs for surveys include: Peasley-Cougar Creeks, Meadow Creek, Mill Creek, South Fork Canyon; later after some restorative management has been implemented, survey in American River, Crooked River, John's Creek, and Red River ERUs.
3. **Fisher** - Status: Forest Service sensitive; late-seral dependent species; security-dependent species; priority ERUs for surveys include: American River, Newsome-Leggett Creeks, Silver Creek, and Meadow Creek.
4. **Goshawk** - Status: Forest Plan Old Growth Indicator; late-seral dependent; priority ERUs for surveys include: Meadow Creek, Mill Creek, and John's Creek.

MODERATE PRIORITY SPECIES

1. **Lynx** - Status: Forest Service sensitive; security-dependent species; priority ERUs for surveys include the following (after some measure of high elevation burns or timber harvests have been implemented): John's Creek, American River, Crooked River and Red River.
2. **Elk** - Status: Forest Plan Management Indicator; winter range is limiting factor; Idaho Department of Fish and Game traditionally conduct winter counts; priority ERUs recommended for surveys include: South Fork Canyon, Newsome-Leggett Creeks, and Red River.
3. **Pileated woodpecker** - Status: Forest Plan Old Growth Indicator; priority ERUs for surveys include: South Fork Canyon, Meadow Creek, Peasley-Cougar Creeks, Silver Creek, American River, Crooked River, Wing Creek, Twentymile Creek, John's Creek, and Mill Creek.

LOWEST PRIORITY SPECIES

1. **White-headed woodpecker** - Status: Forest Service sensitive; no priority ERUs have been identified for surveys because flammulated owl management will benefit white-headed woodpecker. Although rare, flammulated owls are known to regularly occur within the subbasin, but white-headed woodpeckers do not.
2. **Pine Marten** - Status: Forest Plan Old Growth Indicator; this species is sufficiently common within the subbasin that surveys would be relatively meaningless. To a large degree, management for fisher will benefit pine marten as well. Both pine marten and fishers prefer structurally complex habitats with multiple canopy layers and abundant down woody debris. It is reasonable to assume that if fishers are managed for and become more common, little need exists to survey for pine marten. This condition could change if fur prices rise dramatically, placing pine marten in higher risk for human mortality.
3. **Gray Wolf** - Status: Endangered (Experimental/nonessential); reintroduced individuals from 1995 and '96 transplants have been monitored carefully and USFWS monitoring of wolf recovery is mandated by ESA. Currently, information about wolves is better than for any other species. No priority ERUs were recommended for surveys. Incidental sightings and sign should help determine whether local surveys need to be done to ensure protection of the species and coordination of other management activities with dens/rendezvous areas.
4. **Bald Eagle** - Status: Threatened; continue winter bald eagle surveys (if funds permit); priority ERUs for surveys in winter habitats include: South Fork Canyon (from Mill Creek to Lightning Creek).
5. **Moose** - Status: Forest Plan Management Indicator Species; moose are common within the Clearwater Drainage including the subbasin. Idaho Department of Fish and Game loosely monitor moose populations as part of species management planning. No priority ERUs were recommended for surveys as populations of this animal are slowly increasing.

Appendix F - Old Growth

Old Growth

These are interim recommendations recognizing that Forest Plan standards are inadequate and poorly adapted to provide for some old growth types, settings, and the disturbance regimes in which they occur. The recommendations given here are based on analysis of R1EDIT stand exam data, fire ecology literature, and historic photos and narratives of vegetation in the Nez Perce Forest area. The old growth types follow Green et al. 1992. Minimum requirements vary by old growth type. Minimum age varies from 120 years for lodgepole to 150 years for other forest types. Stands must have a minimum of 3-10 trees per acre greater than 13-25 inches dbh, varying by old growth type. The types are referred to as NIOG Types in Table F-1. The recommendations on amount of each old growth type, most likely location, and disturbance regime, are the most soundly grounded in historic data. Percent old growth is on the basis of the cumulative effects watershed (5th code) rather than the prescription watershed or subwatershed used in the Forest Plan. Analysis would be required to see if these recommendations would be appropriate at a finer scale. Information on persistence through time and patch size needs further evaluation. Persistence through time refers to the likely age limits of the older stand components, before they would be expected to succumb to fire or other mortality. Because much of the Nez Perce is dominated by mixed severity fire regimes, many stands retain some old growth attributes (scattered large old trees, snags, down wood) through one or more disturbances. To retain some of the elements of these old growth types (like two story stands of old larch over a younger understory), some periodic disturbance may be needed. There are data gaps for VRUs 8 and 17 because the number of stands analyzed is not adequate to develop persistence or patch size estimates. Data for VRU 9 are very limited and must be considered very preliminary.

Table F-1 Interim Recommendations for Old Growth by Cumulative Effects Watershed

VRU	Percent Old Growth	Most Common Types	Most Likely Locations	Likely Persistence Through Time	Patch Size (Acres)
1	10-15	Spruce-fir, minor lodgepole or mixed conifer (NIOG types 2, 4, 5, 8)	Wet areas, north aspects	Spruce-fir: to 300 years, lodgepole to 200 years, mixed conifer to 300 years	Mean: 80 Range: 30-300
2	5-10	Spruce-fir, minor lodgepole or whitebark pine (NIOG types 2, 4, 5, 8,)	Trough bottoms, north aspects, rocky ridges	Spruce-fir: to 300 years, lodgepole and whitebark pine to 200 years	Mean: 80 Range: 30-200
3: South aspects	40-60	Ponderosa pine (NIOG Type 1)	Midslopes and ridges	To 350 years, with frequent low severity disturbance	Mean: 300 Range: 50-2000
3: North aspects	20-30	Ponderosa pine, mixed conifer (NIOG Types 3, 4)	Ridges, upper slopes	To 350 years, with moderately frequent mixed severity disturbance	Mean: 200 Range: 50-1000

VRU	Percent Old Growth	Most Common Types	Most Likely Locations	Likely Persistence Through Time	Patch Size (acres)
4	10-25	Ponderosa pine, mixed conifer (NIOG types 1, 4)	Ridges, upper slopes	To 300 years with moderate frequency, mixed and low severity disturbance	Mean: 150 Range: 40-1000
5	10-20	Spruce-fir, mixed conifer, lodgepole pine (NIOG Types 2, 4, 5)	Wet areas	To 300 years, with infrequent, mixed severity disturbance	Mean: 50 Range: 30-300
6	5-15	Spruce-fir, mixed conifer, minor lodgepole pine (NIOG types 2, 4, 5)	Wet areas	To 300 years with infrequent, mixed severity disturbance	Mean: 80 Range: 25-200
7	30-40	Mixed conifer, spruce-fir (NIOG Types 3, 4, 5)	Lower slopes and north aspects	To 300 years with infrequent, mixed severity disturbance	Mean: 300 Range: 30-2000
8	10-15	Mixed conifer, western redcedar (NIOG types 3, 4, 7)	Lower slopes and large valleys	No data	Mean: Range:
9	5-15	Whitebark pine, spruce-fir (NIOG Types 8, 9)	Open ridges	To 300 years with infrequent, mixed severity disturbance	Mean: 40 Range: 20-100
10	15-30	Spruce-fir, mixed conifer (NIOG types 3, 4, 5)	Lower slopes, wet areas, north aspects	To 350 years with infrequent, mixed severity disturbance	Mean: 100 Range: 30-1000
17	20-35	Western redcedar, mixed conifer (NIOG types 3, 4, 7)	Any position	To 600 years with infrequent mixed disturbance	Mean: Range: